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ABSTRACT

This description of AUTHOR, a computer program for the automated authoring of programmed texts designed to teach symbol recognition, includes discussions of the learning strategies incorporated in the design of the instructional materials, hardware description and the algorithm for the software, and current and future developments. Appendices include the AUTHOR workbook, page formats used in the AUTHOR program, a programmed text produced using AUTHOR routines and minor off-line editing, and a programmed text produced using AUTHOR routines with both online and off-line editing. (CMV)

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TAEG Report No. 58

COMPUTER-AIDED AUTHORING OF PROGRAMMED INSTRUCTION FOR TEACHING SYMBOL RECOGNITION

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June 1978

Sponsored by

Chief of Naval Education and Training

and the

David W. Taylor Naval Ship Research and Development Center,
Naval Technical Information Presentation Program

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20. Abstract (continued)

The Naval Technical Information Presentation Program (NTIPP) is a 5-year, multimillion dollar program to improve the Navy's efficiency in carrying out this publishing effort. This effort is managed by the David W. Taylor Naval Ship Research and Development Center with participation by other Navy activities. The Training Analysis and Evaluation Group (TAEG) represents the Chief of Naval Education and Training (CNET) in this program. The program is of special interest to CNET because the technical manuals serve as textbooks in the CNET managed "C" schools, and the training handbooks serve as the student and instructor guides in these schools. Improved documents will result in improved training.

The objective of this report is to describe AUTHOR, a computer program for the automated authoring of programmed texts designed to teach symbol recognition. In addition, sample texts, which represent various levels of off-line editing, are provided to indicate the full range of authoring automation.

Under NTIPP sponsorship, TAEG is pioneering an approach to authoring instructional materials that utilizes general purpose computers to carry out certain operations that are now being laboriously performed by hand. The goal is a technique for authoring effective training materials at a low cost. To demonstrate this approach, TAEG has written a program to aid in authoring materials for teaching symbol recognition. The human author enters information on a set of symbols into a data base. The computer routine merges this with general information on learning symbols and automatically organizes a complete learning package, including a pretest, discrimination drills, symbol recognition exercises, criterion tests, suggestions for refresher training, and an index. The output can be formatted for paper, microfiche, or video display. Using this procedure, authoring consumes a small portion of the time usually required for such projects. Instructional materials developed in this manner by TAEG are being evaluated in the Signalman "A" School and the onboard training program of the Naval Weather Service. The results to date are encouraging and will be formally published in subsequent TAEG reports.

An operator's handbook and program listing are provided in a companion report (TAEG Report No. 59).

ACKNOWLEDGMENTS

The Training Analysis and Evaluation Group (TAEG) is indebted to many people for support and guidance during the study period. The project was conceived with the aid of Robert Sulit, who at that time was technical manager of the Naval Technical Information Presentation Program (NTIPP) at the David W. Taylor Naval Ship Research and Development Center. He provided NTIPP funds for the initiation of the project. The support and guidance of Samuel Rainey, who succeeded Mr. Sulit as technical manager, and Joseph Fuller, deputy technical manager, have been appreciated.

The assistance of a number of TAEG personnel is gratefully acknowledged. Dr. Myron Zajkowski provided direction and guidance in the presentation of the material, and Miss Ann Caramico edited and prepared the report for publication.

Finally, the authors are pleased to acknowledge the constant counsel and support of Dr. Alfred F. Smode, Director of TAEG.

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SECTION I

INTRODUCTION

Publishing technical manuals and training handbooks for new Navy equipment is a high cost operation. In addition, current practices frequently result in the technical data being delivered late or in a form too complex for the reader to use. There are also problems in keeping technical data current and in distributing and storing the data where it is needed.

The Naval Technical Information Presentation Program (NTIPP) is a 5-year, multimillion dollar program to improve the Navy's efficiency in carrying out this publishing effort. State-of-the-art techniques in authoring, editing, composing, typesetting, illustrating, printing, and distributing are being applied to the process of publishing Navy technical information to support the maintenance and operation of Navy equipment. This effort is managed by the David W. Taylor Naval Ship Research and Development Center with participation by other Navy activities. The Training Analysis and Evaluation Group (TAEG) represents the Chief of Naval Education and Training (CNET) in this program. The program is of special interest to CNET because the technical manuals serve as textbooks in the CNET managed "C" schools, and the training handbooks serve as the student and instructor guides in these schools. Improved documents will result in improved training.

This study is the fourth in a series of TAEG reports exploring ways for improving technical manuals and training handbooks. The previous studies in this series describe (1) a plan for CNET involvement with NTIPP in improving Navy training documents (Braby, 1977), (2) the use of microfiche as an instructional medium for technical training (Rizzo, 1977), and (3) the effectiveness and costs of computer-based publishing techniques in meeting CNET publishing requirements (Keeler, 1977). These studies, and others currently underway (see section IV), are described in more detail in the plan for CNET involvement with NTIPP (Braby, 1977).

The current study describes a computer based system for authoring one type of programmed text. The approach and procedures described can be used by both contractor and Navy personnel in producing training manuals of uniform high quality. The data base which is an integral part of the approach can be updated commensurate with changes in training requirements.

Computer-based techniques currently used in publishing newspapers and magazines can be employed to reduce the cost of publishing training manuals and other forms of technical data. Keeler (1977) described computer-based publishing techniques for use in the Naval Education and Training Command. Various options in word processing, text editing, composing, and phototypesetting were included. However, this report did not propose computer aids for authors. The authoring function appears to be one of the last phases of this publishing process to be supported with computer techniques.

It is commonly believed that authoring training materials must be a labor intensive operation in which an author creates a unique stream of words for each writing task. An analysis of the content of instructional materials indicates a great deal of redundancy in this type of writing. The same information may be presented in varying detail in equipment handbooks, job aids, instructor and student guides for factory training, self-paced programmed texts, quizzes and examinations, and, to some extent, in rate training manuals, correspondence courses, advancement in rate examinations, and Personnel Qualification Standards. In addition, standard writing or presentation formats are used repetitively in these instructional materials. These content and format redundancies make computer-aided authoring of instructional materials feasible and potentially practical.

The Training Analysis and Evaluation Group is pioneering an approach to authoring instructional materials that utilizes general purpose computers to perform certain operations now being laboriously performed by hand. The present study demonstrates this approach in authoring materials. The example employed is the teaching of symbol recognition. The human author enters information on a set of symbols into a data base. The computer routine merges this with general information on learning symbols and automatically organizes a complete learning package, including a pretest, discrimination drills, symbol recognition exercises, criterion tests, suggestions for refresher training, and an index. The output can be formatted for paper, microfiche, or video display. Using this procedure, authoring consumes a small portion of the time usually required for such projects.

Instructional materials developed in this manner by TAEG are being evaluated in the Signalman "A" School and the onboard training program of the Naval Weather Service. The results to date are encouraging and will be subsequently published.

OBJECTIVE

The objective of this report is to describe AUTHOR, a computer program for the automated authoring of programmed texts, designed to teach symbol recognition. In addition, sample texts, which represent various levels of off-line editing, are provided to indicate the full range of authoring automation.

ORGANIZATION OF THE REPORT

In addition to this introduction, the report contains three sections and four appendices. Section II describes the learning strategies incorporated in the design of the instructional materials. This includes information on the symbol learning task and the guidelines and learning algorithm used in organizing information for efficient symbol learning. An overview of how one uses the AUTHOR program is also presented including a description of the AUTHOR data base, formatting routines, and editing procedures. Section III outlines the equipment used in operating the AUTHOR program. In section IV, observations are made concerning the utility of AUTHOR-type programs in preparing programmed texts to teach symbol recognition and other types of job-task skills.

Appendix A lists the information to be entered into the data base by the human author. A set of standard page formats produced by the computer is presented in appendix B. Included are the student directions for taking and scoring various tests and exercises and page layout information on each type of page produced by the AUTHOR routines. Sample programmed texts produced using AUTHOR are provided in appendices C and D. Appendix C depicts a manual retype of an initial computer output incorporating minor editorial changes. It illustrates the type of document that is produced using the basic AUTHOR routines. The programmed text in appendix D was developed using all facets of the AUTHOR program, including the on-line editing routines. It illustrates the types of changes that can be made to respond to the special characteristics of a training problem.

SECTION II

DESIGN OF THE INSTRUCTIONAL MATERIALS

The AUTHOR program is built to automatically organize and output information on symbols in a form suitable for teaching symbol recognition. In this context, symbol recognition refers to such tasks as reading electronic symbols on a schematic diagram; identifying symbols on maps, weather charts, and status boards; or recalling the meaning of signal flags, abbreviations, or acronyms.

The design of the AUTHOR program is based on the Interservice Procedures for Instructional System Development (1975) algorithm for identifying symbols. This method (see figure 1) defines a basic sequence of learning events responsive to research on how people learn to recognize symbols and recall their meanings. The principles of learning incorporated into the algorithm are listed in table 1. Together the learning guidelines and algorithm served as design criteria for the page formats used in displaying the information to be learned.

While the learning guidelines and algorithm for identifying symbols establish broad criteria for the design of pages, they do not provide guidance on many of the detailed design decisions that have to be made. This report serves as an extension of the learning guideline and algorithm and illustrates how to organize information on pages to carry out the intent of one set of learning guidelines and algorithm in the interservice procedure.

General purpose page formats have been created for presenting directions, symbols and memory aids, and for providing practice exercises. Figure 2 lists the more important page formats and shows their sequence in a programmed text. Individual page formats exist for displaying the learning objectives and other introductory information, symbol discrimination drills, presentation of symbols and meanings, drills for recalling symbols, self-tests, criterion tests, and suggestions for refresher training. The page formats can be adapted to a wide range of symbol types and sizes.

Figures 3, 4, and 5 display a set of three pages generated by the AUTHOR program for an exercise in recalling symbols. The first page provides directions for practice; the second page contains the practice material; the third page provides directions for additional practice.

There are six steps in using the AUTHOR program. An overview of this procedure is presented in figure 6 and described briefly in this section. A detailed operating guide is presented in a companion TAEG report (Guitard, 1978).

In step 1, the human author supplies the information called for in an author's workbook (see appendix A). This information includes the title, authors, publisher, publication date, training objective, a statement describing the importance of knowing the specific set of symbols, and examples of how the symbols are used. The author then compiles a table containing each symbol, its meaning, and a simple memory aid. In step 2, this information is keyed into computer memory. At this time the AUTHOR routines create the data base and compose all the pages in the programmed text (steps 3 and 4). In step 5 each page can be displayed on the CRT, and reviewed for accuracy, appropriateness of layout, and flow of information.

When there is a need to edit the computer composed pages, four ways are available to change the material:

- edit the data base and rerun the program
- edit the computer program (change standard headings, margins, etc.) and rerun the program
- edit the individual pages displayed on the CRT
- make pencil changes to a computer produced manuscript and retype manually.

This is an optional step, in that you could produce the master copy for reproduction at this time without review or editing.

When the electronically stored pages are in an acceptable form, the document is printed (step 6) onto paper by the use of a line printer, computer driven typewriter, or phototypesetter. If a direct microfiche output is required, or if graphic symbols are included, the phototypesetter should be used.

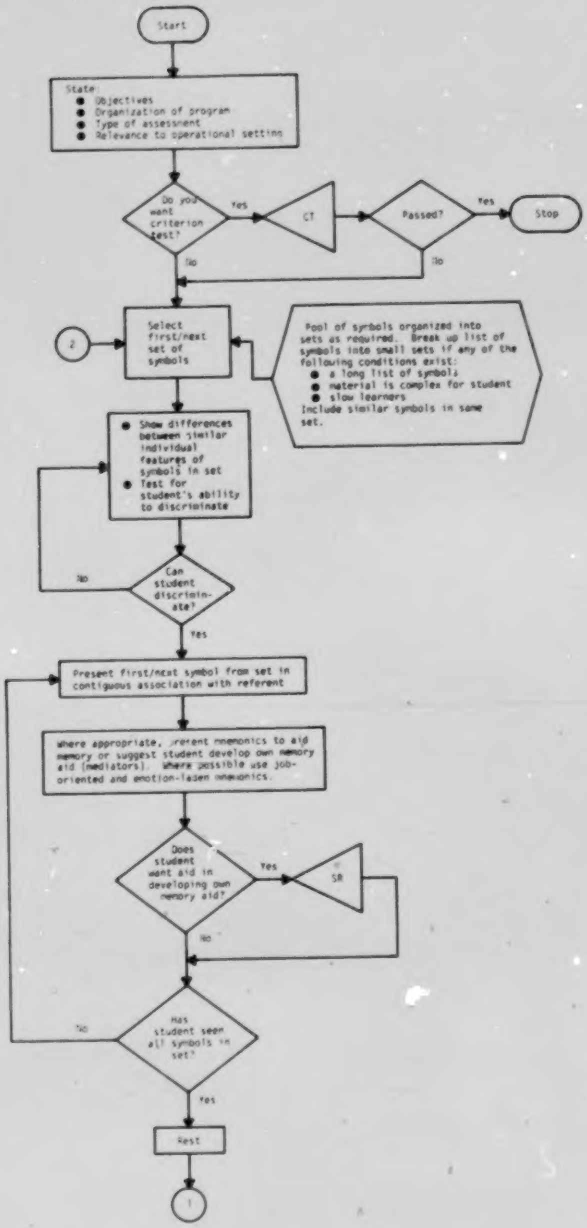

Start
State:
● Objectives
● Organization of program
● Type of assessment
● Relevance to operational setting
Do you want criterion test?
Yes
CT
Passed?
Yes
Stop
No
No
2
Select first/next set of symbols
Pool of symbols organized into sets as required. Break up list of symbols into small sets if any of the following conditions exist:
● a long list of symbols
● material is complex for student
● slow learners
Include similar symbols in same set.
● Show differences between similar individual features of symbols in set
● Test for student's ability to discriminate
No
Can student discriminate?
Yes
Present first/next symbol from set in contiguous association with referent
Where appropriate, present mnemonics to aid memory or suggest student develop own memory aid (mediators). Where possible use job-oriented and emotion-laden mnemonics.
Does student want aid in developing own memory aid?
Yes
SR
No
No
Has student seen all symbols in set?
Yes
Rest
1

Figure 1. Learning Algorithm for Identifying Symbols

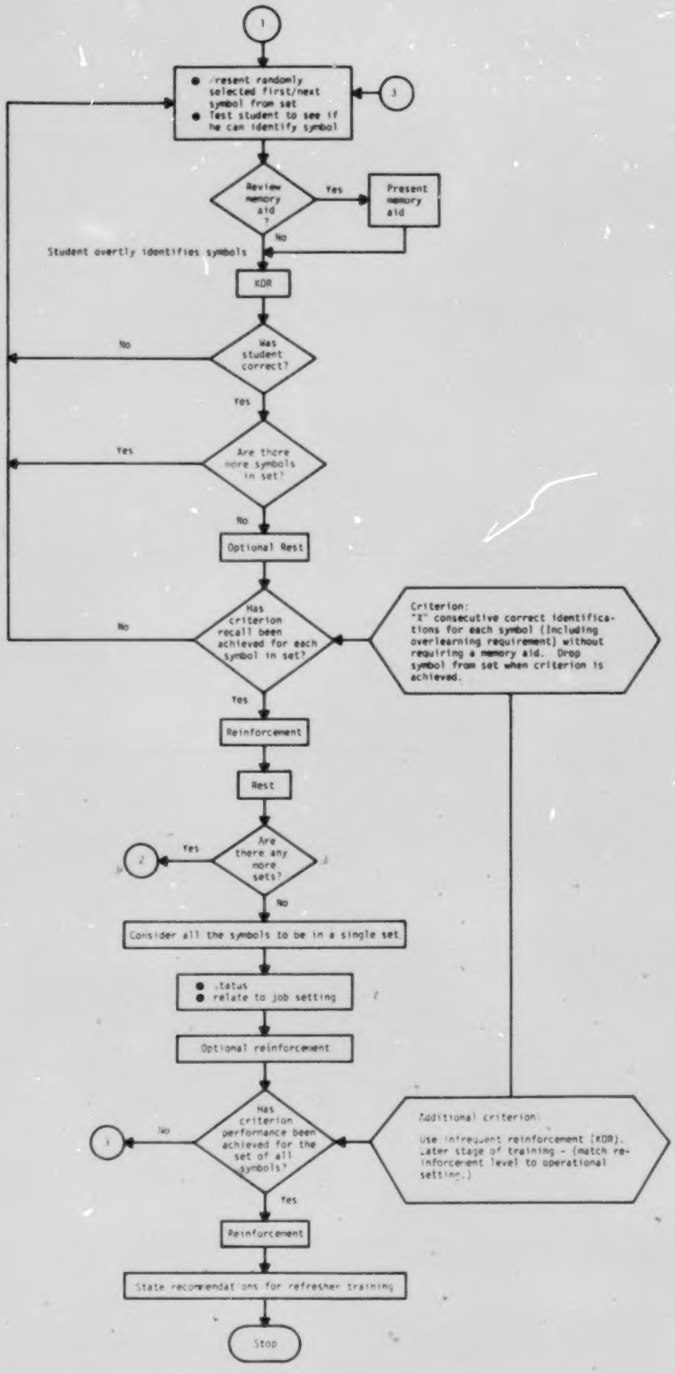

1
● Present randomly selected first/next symbol from set
● Test student to see if he can identify symbol
3
Review memory aid ?
Yes
Present memory aid
No
Student overtly identifies symbols
KOR
Was student correct?
No
Yes
Are there more symbols in set?
Yes
No
Optional Rest
Has criterion recall been achieved for each symbol in set?
No
Criterion:
"X" consecutive correct identifications for each symbol (Including overlearning requirement) without requiring a memory aid. Drop symbol from set when criterion is achieved.
Yes
Reinforcement
Rest
Are there any more sets?
Yes
2
No
Consider all the symbols to be in a single set
● Status
● relate to job setting
Optional reinforcement
Has criterion performance been achieved for the set of all symbols?
No
3
Additional criterion:
Use infrequent reinforcement (KOR). Later stage of training - (match reinforcement level to operational setting.)
Yes
Reinforcement
State recommendations for refresher training
Stop

Figure 1. Learning Algorithm for Identifying Symbols (continued)

TABLE 1. LEARNING GUIDELINES FOR IDENTIFYING SYMBOLS

1. Relate training clearly to meaningful and job related tasks.

2. Show differences between similar individual features of symbols. Do this before associating these symbols with identification responses.

3. Break up the total list of symbols into smaller sets when any of the following conditions exist:

   a. A long list of symbols is to be learned.

   b. Material is complex for students.

   The size of the set for each student should vary according to how much each of the factors departs from the normal situation for each condition.

4. Present the associate item (or meaning) immediately after the symbol in time as the basis for this kind of training.

5. Randomize the order of the presentation of the symbols to the student so that all symbols will be learned equally well.

6. Use mnemonics (associating recall of symbols with imagery, rhymes or rhythms) for difficult to recall symbols. Provide mnemonics which will cause an affective reaction in the student. Also provide directions for the student to develop his own mnemonics.

7. Allow for self-paced practice with knowledge of results (KOR).

8. Prevent decay of recall by (1) requiring the student to overlearn the original associations and (2) ensuring periodic refresher training.

9. Test for correct identification of symbols by measuring overt performance by the student.

10. Provide self-paced training that can be adapted to the individual student's needs. Both rate and level of learning depend upon the characteristics of the individual student.

11. Use immediate KOR and frequent reinforcement in the early stages of training. In later stages of training, match the KOR and reinforcement levels that exist in the operational setting.

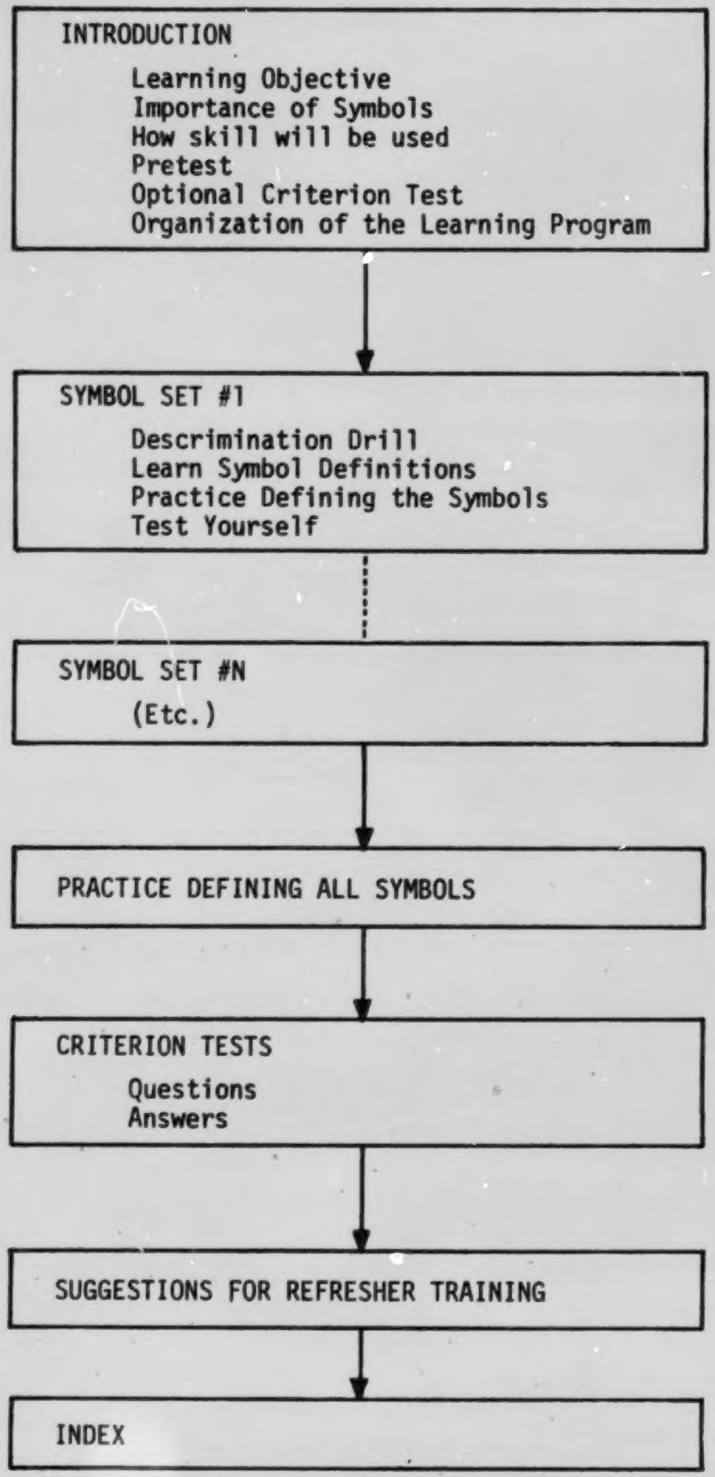

INTRODUCTION
Learning Objective
Importance of Symbols
How skill will be used
Pretest
Optional Criterion Test
Organization of the Learning Program
SYMBOL SET #1
Descrimination Drill
Learn Symbol Definitions
Practice Defining the Symbols
Test Yourself
SYMBOL SET #N
(Etc.)
PRACTICE DEFINING ALL SYMBOLS
CRITERION TESTS
Questions
Answers
SUGGESTIONS FOR REFRESHER TRAINING
INDEX

Figure 2. The Sequence of Page Formats Used in the Programmed Texts

AUTHOR: An Automatic Authoring System Version: 2.0

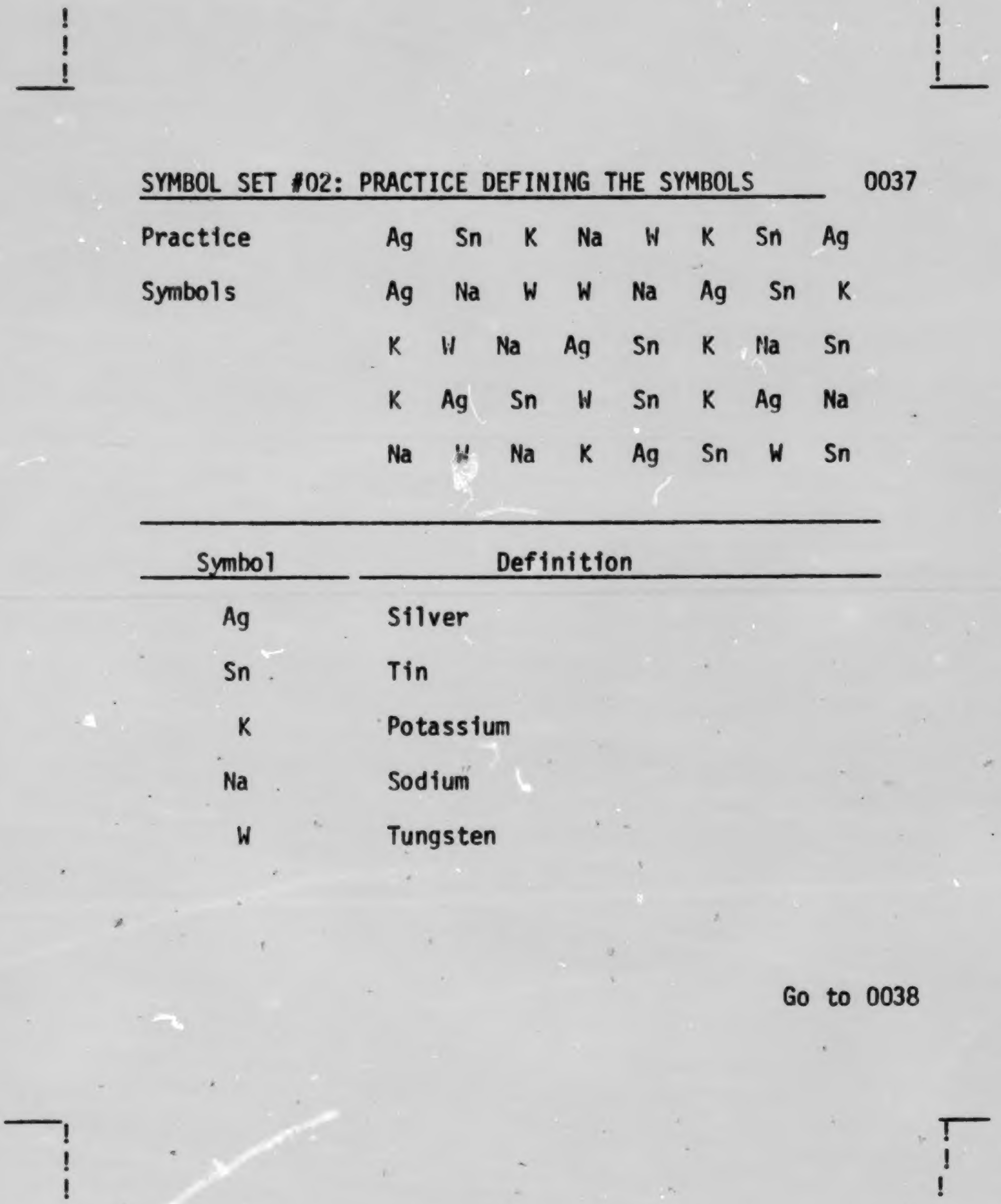
SYMBOL SET #02: PRACTICE DEFINING THE SYMBOLS 0036

Directions

1. Read all directions before you practice defining the symbols.
2. Try to recall the definition of each symbol in the exercise on frame 0037 .
3. WRITE your first impression of the symbol's definition.
4. If the definition is difficult to remember, recall the memory aid first, then recall the definition.
5. Check your answer immediately in the answer section below the symbols.

Go to 0037

Figure 3. Format: Practice Defining the Symbols, Part 1, Directions



AUTHOR: An Automatic Authoring System Version: 2.0

SYMBOL SET #02: PRACTICE DEFINING THE SYMBOLS 0037

Practice Symbols

Ag Sn K Na W K Sn Ag
Ag Na W W Na Ag Sn K
K W Na Ag Sn K Na Sn
K Ag Sn W Sn K Ag Na
Na W Na K Ag Sn W Sn

Symbol	Definition
Ag	Silver
Sn	Tin
K	Potassium
Na	Sodium
W	Tungsten

Go to 0038

Figure 4. Format: Practice Defining the Symbols, Part 2, Practice Symbols

AUTHOR: An Automatic Authoring System Version: 2.0

SYMBOL SET #02: PRACTICE DEFINING THE SYMBOLS 0038

Directions

1. Keep practicing until you feel you know the definition of each symbol.
2. Practice defining the most difficult symbols for you more than the easier symbols.
3. Change the order of going through the practice symbol list as you study. Examples of how you might vary the order of studying the symbol codes in the list:

```
----->    <-----    ----->    <-----
<-----    ----->    ----->    <-----
----->    <-----    ----->    <-----
```

To practice... Go back to 0037

After practicing... Go to 0039

Figure 5. Format: Practice Defining Symbols, Part 3, Directions for Additional Practice

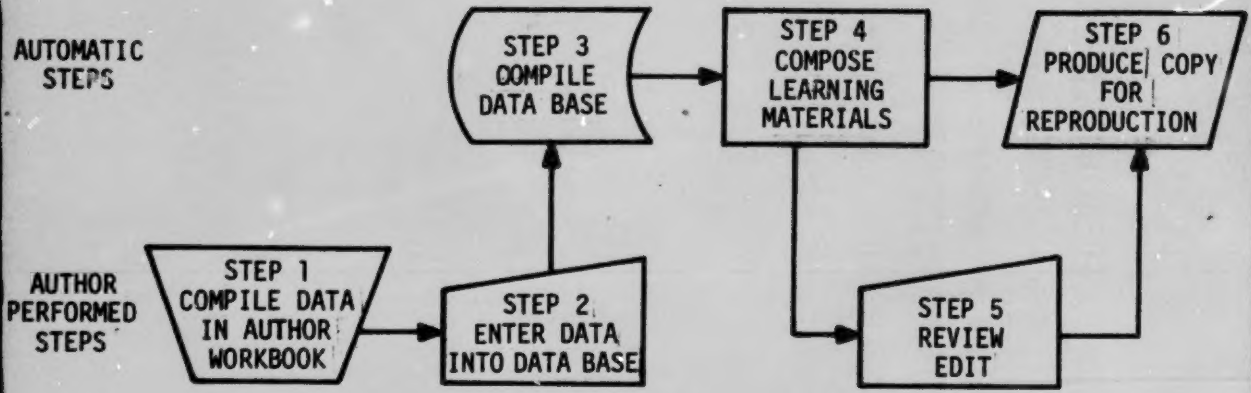

AUTOMATIC STEPS
AUTHOR PERFORMED STEPS
STEP 1 COMPILE DATA IN AUTHOR WORKBOOK
STEP 2 ENTER DATA INTO DATA BASE
STEP 3 COMPILE DATA BASE
STEP 4 COMPOSE LEARNING MATERIALS
STEP 5 REVIEW EDIT
STEP 6 PRODUCE COPY FOR REPRODUCTION

Figure 6. Steps in the Use of the AUTHOR Program

SECTION III

MACHINE DESCRIPTION AND PROGRAM ARCHITECTURE

The automatic authoring software described in this report was developed using a WANG 2200T and a WANG 2200VP minicomputer system. This hardware configuration was utilized because of its availability. No optimum hardware configuration was considered due to monetary constraints. The configuration used is shown in figure 7. Figure 8 shows the minimum hardware configuration capable of supporting the AUTHOR system software. Both central processing units (CPU) contain 32K bytes of main storage. This small amount of main storage made it necessary to use program overlays extensively in developing the software. All software is written in WANG Basic which is an extended version of Dartmouth Basic. While the WANG 2200 is probably not the best hardware to use for such an endeavor, the Basic-2 language available with the WANG 2200VP may be. WANG Basic-2 has extensive capabilities for manipulating alphanumeric strings.

The author system software is based on the algorithm previously shown in figure 1. A system diagram of the automatic authoring system is shown in figure 9. The output data base is generated by combining data from the user's data base and the general format data base. Figure 10 is a high level program flowchart that describes the general sequence of events that occurs during program execution. Generated parts of a sample frame are depicted in figures 11 through 14. Figure 11 shows the generic format loaded from the general format data base. The frame shown in figure 12 was created by selecting five symbols together with their definition from the user's data base and merging them with the generic format of figure 11. Figure 13 was created by randomly placing the symbols in the top portion of the frame. Finally, the completed frame, shown in figure 14, was created by adding the appropriate frame numbers to the previously generated frame.

The concepts underlying this process are expressed in some detail in the companion report (Guitard, 1978). That report also contains a source listing of the automatic authoring system program. The source listing contains numerous remarks and definitions to facilitate ease of use. Detailed information about the automatic authoring system program operation and architecture may be obtained by studying the source program.

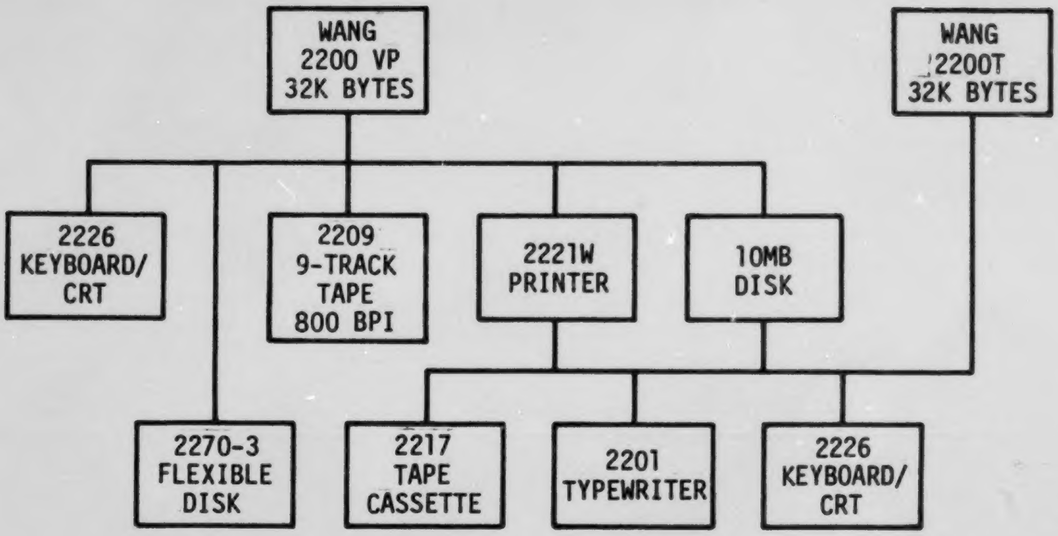

WANG
2200 VP
32K BYTES
WANG
2200T
32K BYTES
2226
KEYBOARD/
CRT
2209
9-TRACK
TAPE
800 BPI
2221W
PRINTER
10MB
DISK
2270-3
FLEXIBLE
DISK
2217
TAPE
CASSETTE
2201
TYPEWRITER
2226
KEYBOARD/
CRT

Figure 7. AUTHOR System Hardware Configuration

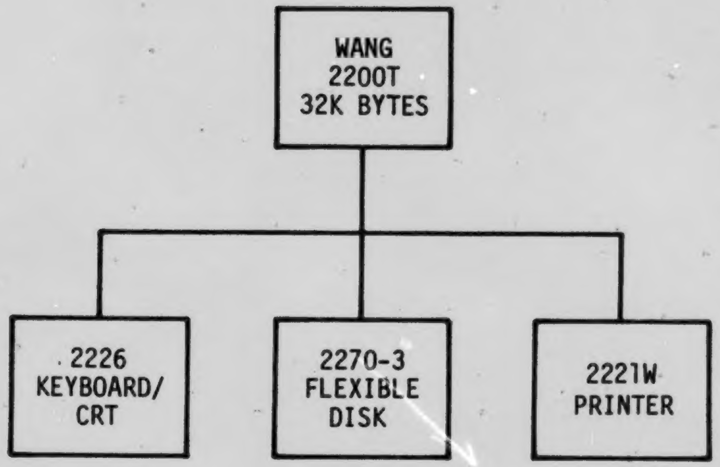

WANG
2200T
32K BYTES
2226
KEYBOARD/
CRT
2270-3
FLEXIBLE
DISK
2221W
PRINTER

Figure 8. Minimum AUTHOR System Hardware Configuration

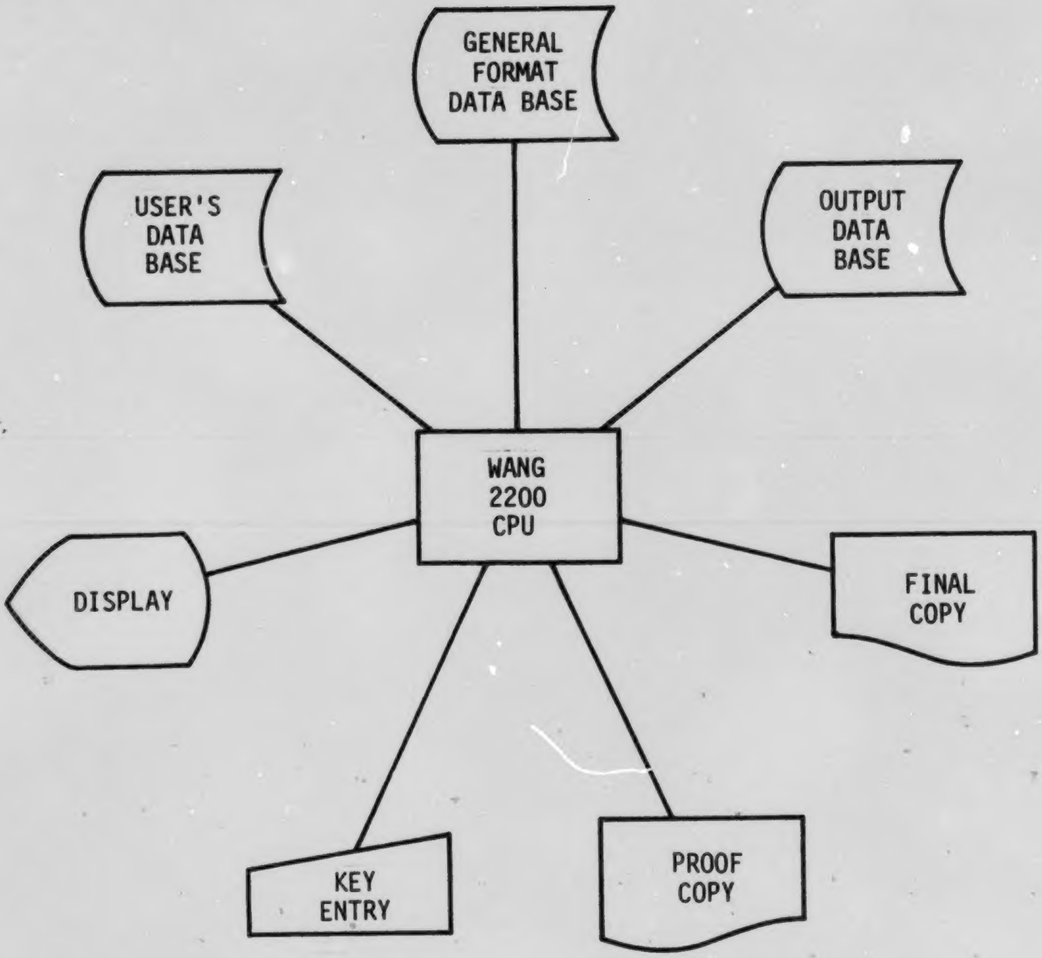

GENERAL FORMAT DATA BASE
USER'S DATA BASE
OUTPUT DATA BASE
WANG 2200 CPU
DISPLAY
FINAL COPY
KEY ENTRY
PROOF COPY

Figure 9. AUTHOR System Diagram

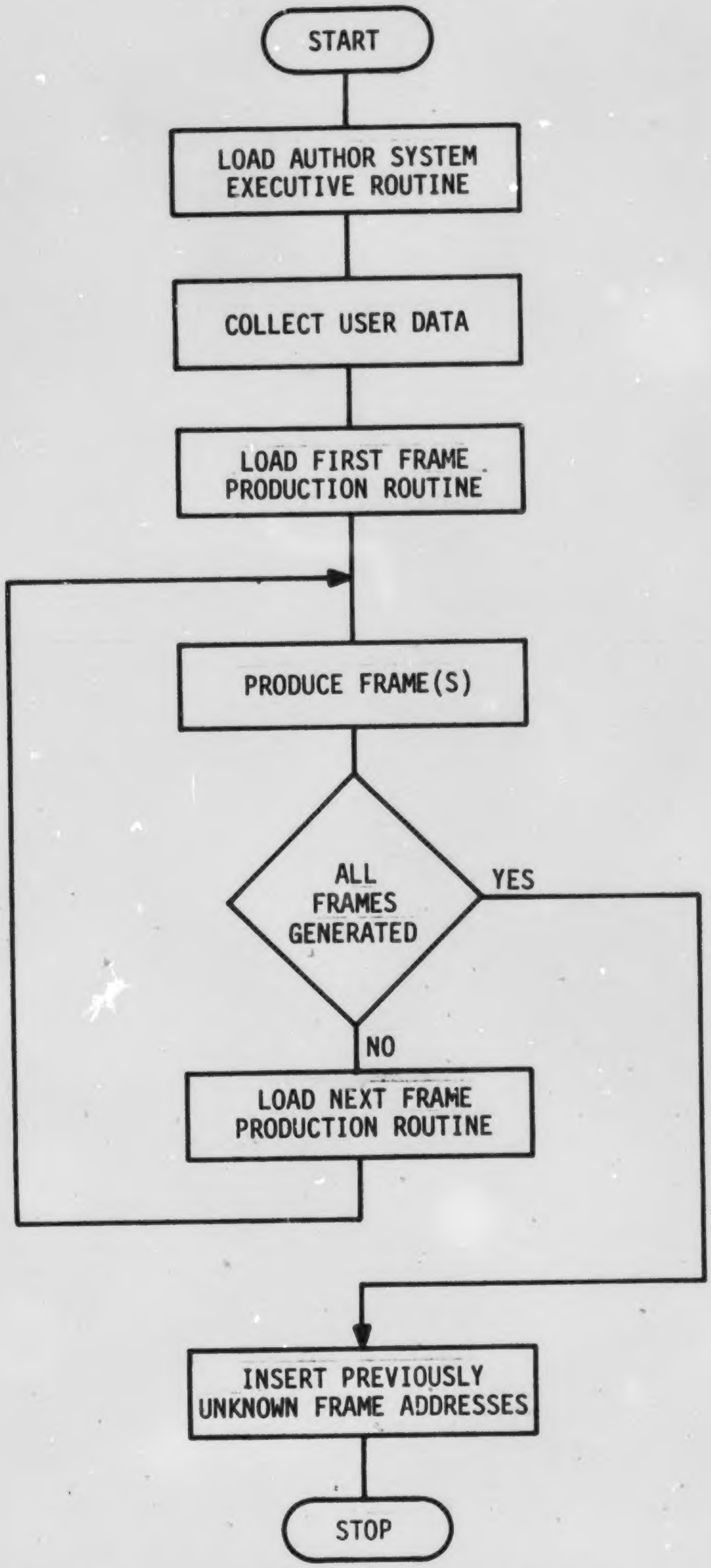

START
LOAD AUTHOR SYSTEM EXECUTIVE ROUTINE
COLLECT USER DATA
LOAD FIRST FRAME PRODUCTION ROUTINE
PRODUCE FRAME(S)
ALL FRAMES GENERATED
YES
NO
LOAD NEXT FRAME PRODUCTION ROUTINE
INSERT PREVIOUSLY UNKNOWN FRAME ADDRESSES
STOP

Figure 10. AUTHOR Program High Level Flowchart

AUTHOR: An Automatic Authoring System Version: 2.0

SYMBOL SET # : PRACTICE DEFINING THE SYMBOLS

Practice

Symbols

Symbol	Definition

Go to

Figure 11. Generic Portion of Sample Frame

AUTHOR: An Automatic Authoring System Version: 2.0

SYMBOL SET # : PRACTICE DEFINING THE SYMBOLS

Practice

Symbols

Symbol	Definition
Ag	Silver
Sn	Tin
K	Potassium
Na	Sodium
W	Tungsten

Go to

Figure 12. Part of Sample Frame

AUTHOR: An Automatic Authoring System   Version: 2.0

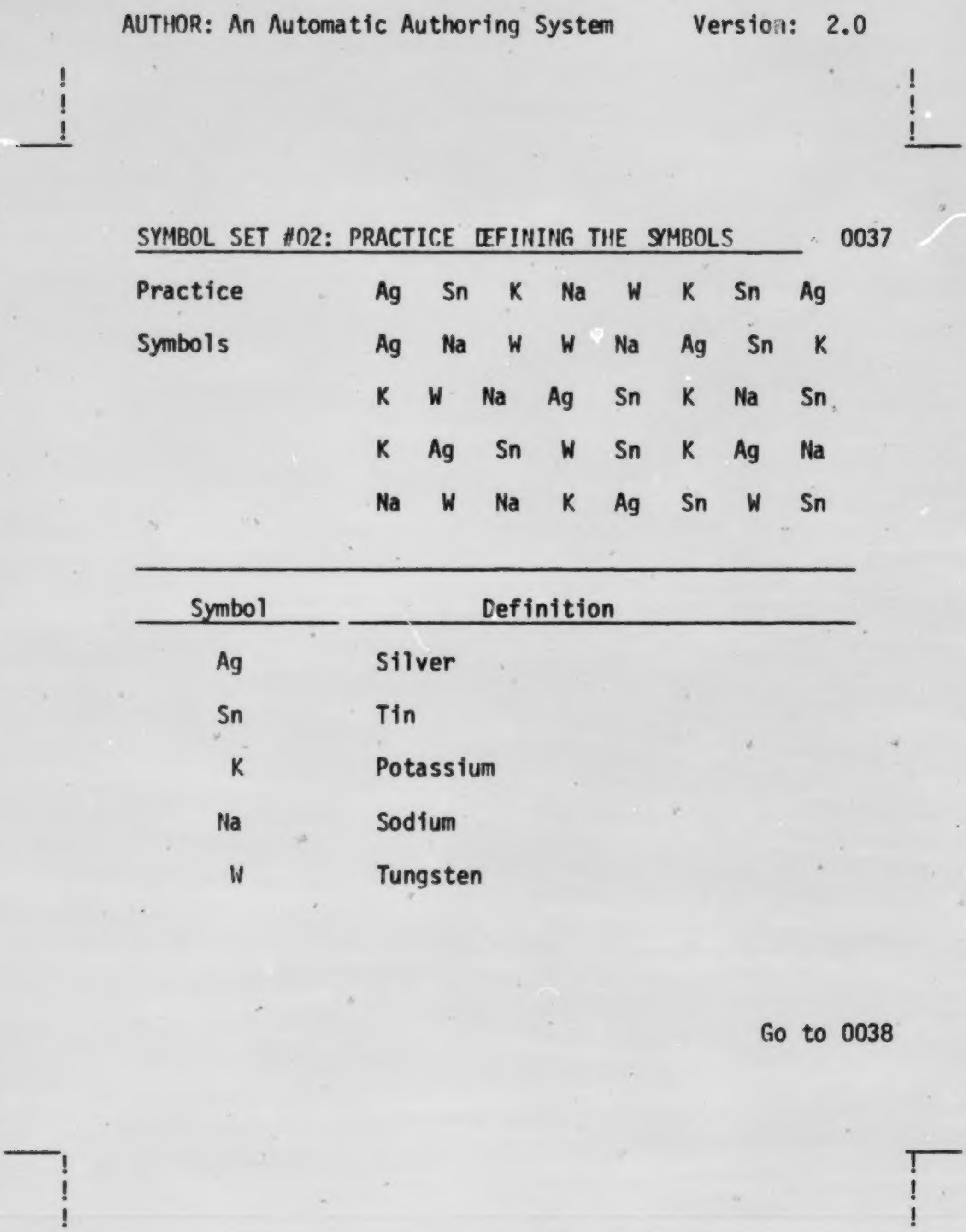
SYMBOL SET # : PRACTICE DEFINING THE SYMBOLS

Practice	Ag	Sn	K	Na	W	K	Sn	Ag
Symbols	Ag	Na	W	W	Na	Ag	Sn	K
	K	W	Na	Ag	Sn	K	Na	Sn
	K	Ag	Sn	W	Sn	K	Ag	Na
	Na	W	Na	K	Ag	Sn	W	Sn

Symbol	Definition
Ag	Silver
Sn	Tin
K	Potassium
Na	Sodium
W	Tungsten

Go to

Figure 13. Part 2 of Sample Frame



AUTHOR: An Automatic Authoring System Version: 2.0

SYMBOL SET #02: PRACTICE DEFINING THE SYMBOLS 0037

Practice	Ag	Sn	K	Na	W	K	Sn	Ag
Symbols	Ag	Na	W	W	Na	Ag	Sn	K
	K	W	Na	Ag	Sn	K	Na	Sn
	K	Ag	Sn	W	Sn	K	Ag	Na
	Na	W	Na	K	Ag	Sn	W	Sn

Symbol	Definition
Ag	Silver
Sn	Tin
K	Potassium
Na	Sodium
W	Tungsten

Go to 0038

Figure 14. Sample Frame

SECTION IV

CURRENT AND FUTURE DEVELOPMENTS

CURRENT DEVELOPMENTS

Two critical questions require substantial clarification regarding the usefulness of the AUTHOR program: "Are materials authored in this manner effective training materials?" and "Is it cost-effective to prepare materials in this manner?"

To resolve the first question, three versions of a programmed text have been produced using the AUTHOR routines. These are currently being compared in Navy classrooms with material authored in a traditional manner. The training effectiveness of each is the issue under examination.

The second question is being resolved in a study currently being conducted with the Naval Weather Service Onboard Training Program. Fifteen programmed texts are being authored. The analyses will examine the resources of man-hours and dollars involved in the production of materials. The cost of authoring equivalent materials in a traditional manner will also be determined. Comparisons between the cost of producing programmed texts using AUTHOR-type routines and the traditional authoring techniques will be made.

The concern of the present report centered on computer aided authoring with alphanumeric symbols and memory aids. Many symbols and memory aids, however, are graphic and materials presented graphically cannot be authored automatically. The graphic materials shown in appendix D were added manually to the final text. At present, this problem is near solution. The Training Analysis and Evaluation Group is currently making arrangements to digitize line drawings and continuous tone photographs. Digitized graphics will be automatically included in the texts through the use of a third generation phototypesetter. A diagram of the additional equipment required to provide this capability is shown in figure 15.

A symbol learning package containing digitized graphic symbols will be produced as follows. The graphic symbols are assigned a reference number and digitized on a digitizer. The authoring system then produces a learning package containing all of the necessary textual information along with the reference numbers of the graphic symbols. This package information is written on a 9-track magnetic tape. Along with the tape from the digitizer, this tape becomes an input file for the phototypesetter. This device, operating under the control of an input language, produces the desired microfiche or camera-ready copy.

The use of a phototypesetter offers many additional benefits other than the ability to handle graphics. Virtually, an unlimited number of type fonts and sizes are available allowing the easy mixture of various fonts and sizes of type on a single page. The distance between lines can be varied and photographs can be cropped and expanded to fit available space.

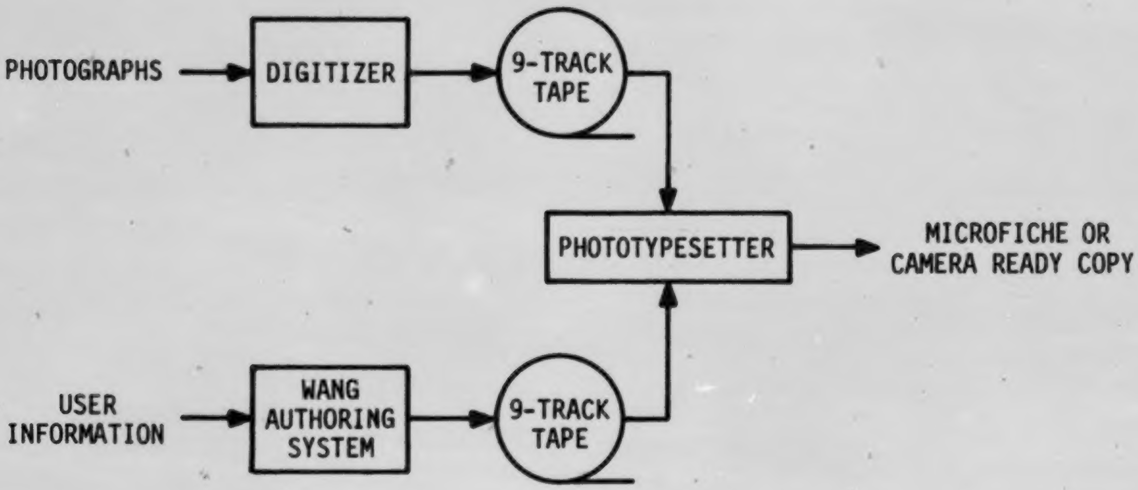


Figure 15. System Diagram of Additional Equipment Required for Digitized Graphics

FUTURE DEVELOPMENTS

The TAEG has been tasked by the David W. Taylor Naval Ship Research and Development Center to implement the procedure following algorithm described in the Interservice Procedures for Instructional System Development (1975). The resultant computer program will deal with teaching equipment operating and maintenance procedures that are carried out with the aid of checklists. The procedure following algorithm relies heavily on photographs and other graphics. Procedure following training packages will be created using the following general procedure. The data base will be created and will include detailed information on each step in the procedure. Supporting photographs and graphics will be digitized. Once this is accomplished, second generation AUTHOR software will produce the pages. These pages can then be viewed on a raster graphics display for review and editing. The human author will be able to make changes and annotate photographs and graphics. These annotations will become part of an overlay file. Once the author is satisfied with the training package contents, the text, graphic, and overlay files will be merged together using a phototypesetter to produce the master copy.

A major goal in this follow-on effort is to determine the usefulness of digitized graphics in AUTHOR-type programs. It appears that recent advances in phototypesetters, memory technology, and continuous tone digitalization make it feasible for the Navy to use digitized graphics in authoring training materials. For example, 85,750 bytes are required to store a 5 x 7 inch photograph that is to be reconstructed at a resolution of 70 lines per inch and 16 levels of gray. However, using magnetic tape recorded at 6,250 bytes/inch, approximately 1,879 of these photographs can be stored on a standard 10.5 inch reel. The archival off-line storage cost is very low using this medium. Approximate cost of 0.000001 cents per bit may be achieved (Theis, 1978). This amounts to 0.7 cents per 5 x 7 inch photograph.

If AUTHOR-type programs prove to be practical in preparing material to teach checklist-oriented equipment operation/maintenance procedures, similar programs should prove useful in authoring instructional materials for teaching other types of job-tasks. The Interservice Procedures for Instructional System Development (1975) lists 11 training task categories; seven of these are candidates for AUTHOR-type routines. Routines exist or are being prepared for the categories of "Identifying Symbols," and "Recalling Procedures." The remaining five training task categories that may be similarly supported are "Rule Learning and Using," "Classifying-Recognizing Patterns," "Making Decisions," "Recalling Bodies of Knowledge," and "Voice Communicating."

In addition, it may be possible to produce job aids and technical manuals using the procedure learning technique. In the future, instead of procuring technical manuals, the government may procure a digital data base on the characteristics and operation/maintenance procedures for a new piece of equipment. Training materials, job aids, or reference data would then be generated as required from the data base using AUTHOR-type routines. The information could be updated by merely revising the data base and rerunning the AUTHOR program. The Training Analysis and Evaluation Group is continuing to explore the reasonableness of this concept in conjunction with the Navy Technical Information Presentation Program.

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APPENDIX A

AUTHOR WORKBOOK

AUTHOR WORKBOOK

This appendix contains a copy of the AUTHOR Workbook that has been used to record information on the Plain Language Terminal Forecast (PLATF) Code for weather messages. The information typed in script was keyed into a data base and was used to generate the program text in appendix C.

AUTHOR WORKBOOK

An Automatic Authoring System - Data Entry Workbook Page 1

This workbook outlines the information that you, the author, must supply to create an instructional module for teaching symbol recognition. In providing this information, follow the directions carefully. Record your information in the spaces provided.

1. Enter the following information for the title page:

1.1 ** Title: *The Plain Language Terminal Forecast (PLATF) Code*

Max: 2 lines, 45 characters per line.

1.2 Subtitle: __________

Max: 2 lines, 50 characters per line.

1.3 ** Author(s): __________

Max: 4 lines, 50 characters per line.

1.4 Date wanted on title page: *September 1977*

Max: 1 line, 50 characters per line.

1.5 ** Organization producing the program: *NAVWEASERVFAC Pensacola*

Max: 2 lines, 50 characters per line.

** See section 2.0 of TAEG Report No. 59 (Vol. I) for special formatting techniques.

2. ** Record your learning objective(s): *After completing this lesson you will be able to recall the meaning of each element (letter group and abbreviation) in the symbolic form of the PLATF.*

Max: 8 lines, 35 characters per line.

3. General Information:

3.1 Name of the group (or rating) that is the user of this learning module.
Complete this statement: Knowing those symbols will make you a better *Aerographer's Mate.*

Max: 2 lines, 45 characters per line.

3.2 Type of symbols to be learned. Complete this statement: You may already know some or all of these *PLATF letter symbols.*

Max: 1 line, 60 characters per line.

3.3 Source of reference for definition of symbols. Complete this statement:
As found in *Naval Weather Service Command Instruction 3143.1 ( ), Change 2 (see appendix A -- Frame 1EB - for a copy).*

Max: 3 lines, 45 characters per line.

** See section 2.0 of TAEG Report No. 59 (Vol. I) for special formatting techniques.

An Automatic Authoring System - Data Entry Workbook

4. Enter convincing reasons why the user will need to recognize and define these symbols:

4.1 Importance of knowing the symbols:

The PLATF is transmitted every 6 hours. It is used on a continuing basis by the forecasters at all Naval Air Stations. Therefore, it is imperative that the Aerographer's Mate recognize these symbols at a glance.

Max: 8 lines, 40 characters per line.

4.2 ** Indicate how the skill will be used.

Complete this statement: This program will help you to:

** encode a PLATF for transmission.

** decode the PLATFs for flight forecasts/briefings.

Max: 8 lines, 40 characters per line.

** See section 2.0 of TAEG Report No. 59 (Vol. I) for special formatting techniques.

5. ** Give realistic examples of on-the-job situations in which the trainee will use these symbols:

EXAMPLES OF HOW SYMBOLS ARE USED

SAMPLE FORMAT - The PLATF message format looks like this:

G_1 G_1 G_2 G_2 h_s h_s NVVww ddff (Plain English) QNH

Each symbolic letter or letter group represents information to be included in the message, such as:

G_1 G_1 = start of forecast period in whole hours GMT.

G_2 G_2 = end of forecast period in whole hours GMT.

h_s h_s = height of base of each cloud layer above ground

Etc.

SAMPLE MESSAGE - A PLATF message based on this code might appear like this: PLATF 1212 25BKN 10 2310 QNH 30.00

SAMPLE ANALYSIS - To determine the meaning of this message, you must compare the coded message format with the letter/number groups in the message.

G_1 G_1 = 1200 GMT; the start of forecast period.

G_2 G_2 = 1200 GMT the following day, the end of the forecast period.

h_s h_s = 2500 feet, the height of the cloud base above the ground.

Etc.

NOTE: There is no limit to the number of example pages you may have.

** See section 2.0 of TAEG Report No. 59 (Vol. I) for special formatting techniques.

6. Arrange the symbols into sets (5 to 7 symbols in each set is recommended; the maximum is 12). You will need to indicate the order in which the symbols will be learned by marking the first set to be learned Set #1, the second set to be learned Set #2, etc. Fill in the following forms until all the symbols have been recorded. Symbols that are often confused for each other should be placed in the same set.

   Note: Each symbol is assigned a symbol reference number when entered into the AUTHOR System. This number will be displayed and should be recorded in the space provided.

SET	SYMBOL #	SYMBOL	DEFINITION	MEMORY AID	SIMILAR SYMBOLS
1		G_1 G_1	Start of forecast period in whole hours GMT	G = GMT; 1 = start	
		G_2 G_2	End of forecast period in whole hours GMT	G = GMT; 2 = end	
		h_s h_s	Height of base of each cloud layer above ground in hundreds of feet	h = height s = base	
		N	Amount of sky cover in each	N = Number of 1/10th	
		VV	Vicibility in statute miles	Visibility	
		ww	Weather and obstructions to vision	weather, weather	
		dd	Direction of surface wind in tens of degrees	direction of wind	
		ff	velocity of wind in whole knots	force of wind	
		QNH	Lowest altimeter setting forecast in inches	INCHES	
2		OCNL	Occasional	OCCASIONAL	
		TEMP	TEMPORARY	TEMPORARY	
		VCNTY	VICINITY	VICINITY	
		GRADU	GRADUALLY	GRADUALLY	
		FROPA	FRONTAL PASSAGE	FRONTAL PASSAGE	
		V	VARIABLE	VARIABLE	

APPENDIX B

PAGE FORMATS USED IN THE AUTHOR PROGRAM

Examples of types of pages produced by the AUTHOR routines are displayed in this appendix. These examples are constructed so as to make clear which words remain the same every time the program is run and which change with each new set of symbols.

The first step in producing these sample pages was to load the data base with information marked so that words printed from the data base could be easily identified. This was accomplished by placing parentheses around the information input to the data base. Also, general descriptions were used instead of information on a specific set of symbols; i.e., the input "(Title)" was used instead of a specific title and "(Symbol 1)" was used instead of an actual symbol. The AUTHOR program was then used to create a programmed text. From the complete text, one page of each type of format is included in this appendix. A copy of the data base printout is also included.

These sample pages do not represent the exact layouts of all programmed texts produced using AUTHOR. Each page layout is computed automatically based on the size of the symbols, the number of symbols per set, the length of the meanings, and memory aids and format decisions (such as right or left justification) made while setting up the program. The page numbers are printed last and are not related to the type of information being presented on the page.

0001

(Title)

(Subtitle)

(Author's Name)

(Date of Publication)

(Organization/Publisher)

Go to 0002

INTRODUCTION 0002

Learning

Objective

(Learning Objective)

This lesson will help you learn easily and quickly.

FOR BEST RESULTS, FOLLOW THE DIRECTIONS.

Index

When you need an index to locate practice exercises for refresher training... Go to 0048

To continue Go to 0003

IMPORTANCE OF THIS PROGRAM TO YOU 0003

Importance of Symbols

(Reason for learning to recognize symbols)

How Skill Will be Used

This program will help you to:

(List of tasks requiring knowledge of symbols)

Go to 0004

EXAMPLE OF HOW THE SYMBOLS ARE USED 0004

(Example)

Go to 0005

SYMBOL PRETEST 0005

Purpose

The pretest will help you decide whether you should try the criterion test at this time.

Directions

1. You may already know some or all of these (Name of symbol set).

2. Look through the list of symbols below and see how many you can define.

Symbols

(Symbol 3)	(Symbol 6)
(Symbol 4)	(Symbol 5)
(Symbol 1)	(Symbol 2)
(Symbol 7)	

Go to 0006

OPTIONAL CRITERION TEST 0006

Choose Item #1 1. If you think that there are THREE

Or Item #2 OR MORE of these symbols that YOU DO NOT KNOW, don't waste time taking the criterion test. Go directly to the learning program... Go to 0011

2. If you think you know all the symbols; or you missed only 1 or 2 take the criterion test and see if you can pass it...

Go to 0007

OPTIONAL_CRITERION_TEST______________________________ 0007

Directions

1. Recall the definition of each symbol on the next frame(s).

2. Write each definition on a piece of paper.

3. You must recall the official definition of the symbol to be correct (as found in (Source)).

Go to 0008

OPTIONAL CRITERION TEST: SYMBOLS 0008

1. (Symbol 3) _________
2. (Symbol 4) _________
3. (Symbol 7) _________
4. (Symbol 2) _________
5. (Symbol 1) _________
6. (Symbol 5) _________
7. (Symbol 6) _________

Go to 0009

OPTIONAL CRITERION TEST 0009

Directions 1. Check your answers now.

2. Put an X through your wrong answers.

Symbols	Answers
1. (Symbol 3)	(Definition of symbol 3)
2. (Symbol 4)	(Definition of symbol 4)
3. (Symbol 7)	(Definition of symbol 7)
4. (Symbol 2)	(Definition of symbol 2)
5. (Symbol 1)	(Definition of symbol 1)
6. (Symbol 5)	(Definition of symbol 5)
7. (Symbol 6)	(Definition of symbol 6)

Go to 0010

OPTIONAL CRITERION TEST 0010

Did you pass?	1. Did you miss 1 or less of the symbol definitions? If so, then learn the ones that you missed by studying them on 0009 ... Then Go to 0046
	2. If you missed more than 1 of the symbol definitions, complete this learning program - Now ... Go to 0011

ORGANIZATION OF THE LEARNING PROGRAM 0011

Overview

The list of symbols has been divided into 1 practice sets. You will learn each set separately, using the 'Steps for Easy Learning.' Then you will practice all 7 symbols in the same exercise.

Steps for Easy Learning

```
                     _________________________________________No
                    !                                         !
 ___________     ___!_______     ________   ________         _!_
!Note the   !   !Learn      !   !Practice! !Test    !        Did
!           !   !           !   !        ! !        !
!Differences!   !the        !   !Defining! !Yourself!        You
!           !--!            !--!         !--!       !--
!Among the  !   !symbol     !   !the     ! !        !        Pass
!           !   !           !   !        ! !        !
!Symbols____!   !Definitions!   !Symbols_! !________!        _?_
                                                          Yes____
                                                       Go to 0012
```

SYMBOL SET #01 0012

The symbols in this set are:

(Symbol 1) (Symbol 2)

(Symbol 3) (Symbol 4)

(Symbol 5) (Symbol 6)

(Symbol 7)

You will learn to recognize and define these symbols in the next few frames.

Go to 0013

SYMBOL SET #01: NOTE DIFFERENCES AMONG SYMBOLS 0014

Introduction

Each symbol represents a different thing, yet some of the symbols look very much alike. The symbols presented below may be confused with each other:

(Symbol 3) (Symbol 4)

Carefully note what makes the symbols above different.

At this point in the learning program, look only at the differences among the symbols. Later on in the program you will be given definitions associated with each symbol.

Go to 0015

SYMBOL SET #01: NOTE DIFFERENCES AMONG SYMBOLS   0015

Purpose	This exercise will help you to note the differences among those symbols that are often confused. After you finish with this exercise, you should not confuse similar symbols.
Quiz Directions	1. Read all directions before going to the next frame. 2. Look carefully at this symbol: (Symbol 3) 3. Write the item number of each example of (Symbol 3) on paper. 4. Do not look back at this frame until you have finished the quiz for this symbol. Go to 0016

SYMBOL SET #01: NOTE DIFFERENCES AMONG SYMBOLS   0016

Quiz Symbols

1. (Symbol 4)
2. (Symbol 4)
3. (Symbol 4)
4. (Symbol 2)
5. (Symbol 4)
6. (Symbol 3)
7. (Symbol 3)
8. (Symbol 7)
9. (Symbol 6)
10. (Symbol 1)
11. (Symbol 3)
12. (Symbol 7)
13. (Symbol 4)
14. (Symbol 3)
15. (Symbol 5)
16. (Symbol 1)
17. (Symbol 4)
18. (Symbol 5)
19. (Symbol 3)
20. (Symbol 3)
21. (Symbol 2)
22. (Symbol 1)
23. (Symbol 6)
24. (Symbol 7)
25. (Symbol 5)
26. (Symbol 2)
27. (Symbol 4)
28. (Symbol 4)

Go to 0017

SYMBOL SET #01: NOTE DIFFERENCES AMONG SYMBOLS 0017

Quiz	Symbol	Examples
Answers	(Symbol 3)	6, 7,11,14,19,20

Go to 0018

SYMBOL SET #01: LEARN SYMBOL DEFINITIONS 0022

Directions	1. Look carefully on the next frame at each symbol and its definition.
	2. Repeat the definition to yourself as you look at the symbol.
	3. Study the memory aid to help you remember the definition.
	4. Study each symbol and its definition 2 or 3 times.

Go to 0023

SYMBOL SET #01: LEARN SYMBOL DEFINITIONS 0023

Definition	Symbol	Memory Aid
(Definition of symbol 1)	(Symbol 1)	(Memory aid 1)
(Definition of symbol 2)	(Symbol 2)	(Memory aid 2)
(Definition of symbol 3)	(Symbol 3)	(Memory aid 3)
(Definition of symbol 4)	(Symbol 4)	(Memory aid 4)
(Definition of symbol 5)	(Symbol 5)	(Memory aid 5)
(Definition of symbol 6)	(Symbol 6)	(Memory aid 6)

To Continue Go to 0024

SYMBOL SET #01: REST 0025

Directions -- Relax for a moment or two. Get your mind off your study.

-- Think of something relaxing.

-- You will learn more quickly when you go back to your study if you rest.

Go to 0026

SYMBOL_SET_#01:_PRACTICE_DEFINING_THE_SYMBOLS_____ 0027

Directions	1. Read all directions before you practice defining the symbols. 2. Try to recall the definition of each symbol in the exercise on frame 0028 . 3. WRITE your first impression of the symbol's definition. 4. If the definition is difficult to remember, recall the memory aid first, then recall the definition. 5. Check your answer immediately in the answer section below the symbols.

Go to 0028

SYMBOL SET #01: PRACTICE DEFINING THE SYMBOLS 0028

Practice Symbols	(Symbol 3)	(Symbol 5)	(Symbol 6)
	(Symbol 1)	(Symbol 7)	(Symbol 4)
	(Symbol 4)	(Symbol 6)	(Symbol 2)
	(Symbol 2)	(Symbol 6)	(Symbol 3)
	(Symbol 5)	(Symbol 3)	(Symbol 2)

Symbol	Definition
(Symbol 4)	(Definition of symbol 4)
(Symbol 1)	(Definition of symbol 1)
(Symbol 6)	(Definition of symbol 6)
(Symbol 3)	(Definition of symbol 3)
(Symbol 2)	(Definition of symbol 2)
(Symbol 5)	(Definition of symbol 5)
(Symbol 7)	(Definition of symbol 7)

Go to 0029

SYMBOL SET #01: PRACTICE DEFINING THE SYMBOLS 0029

Directions

1. Keep practicing until you feel you know the definition of each symbol.
2. Practice defining the most difficult symbols for you more than the easier symbols.
3. Change the order of going through the practice symbol list as you study. Examples of how you might vary the order of studying the symbol codes in the list:

```
----->    <-----    ----->    <-----
<-----    ----->    ----->    <-----
----->    <-----    ----->    <-----
```

To practice... Go back to 0028

After practicing... Go to 0030

SYMBOL SET #01: TEST YOURSELF   0031

Directions

1. WRITE the definition of each symbol when you take the self test.

2. If you want a memory aid ...

Go to 0032

3. Refer to the memory aids only when you can't think of the definition.

Self Test

1. (Symbol 2)
2. (Symbol 7)
3. (Symbol 1)
4. (Symbol 4)
5. (Symbol 3)
6. (Symbol 5)
7. (Symbol 6)

For Answers...   Go to 0033

SYMBOL SET #01: TEST YOURSELF 0032

Symbols	Memory Aids
1. (Symbol 2)	(Memory aid 2)
2. (Symbol 7)	(Memory aid 7)
3. (Symbol 1)	(Memory aid 1)
4. (Symbol 4)	(Memory aid 4)
5. (Symbol 3)	(Memory aid 3)
6. (Symbol 5)	(Memory aid 5)
7. (Symbol 6)	(Memory aid 6)

Go Back to 0031

SYMBOL SET #01: TEST YOURSELF 0033

Symbols	Answers
1. (Symbol 2)	(Definition of symbol 2)
2. (Symbol 7)	(Definition of symbol 7)
3. (Symbol 1)	(Definition of symbol 1)
4. (Symbol 4)	(Definition of symbol 4)
5. (Symbol 3)	(Definition of symbol 3)
6. (Symbol 5)	(Definition of symbol 5)
7. (Symbol 6)	(Definition of symbol 6)

Go to 0034

SYMBOL SET #01: TEST YOURSELF 0034

End of Test Directions

1. If you referred to any memory aids during this test, or if you missed one or more definitions, you need to continue to practice:
    - skip symbols you already know
    - start with the most difficult symbols for you
    - do the self test after you practice each time

To Practice... Go Back to 0028

2. If you correctly defined all the symbols...

For next set of symbols... Go to 0035

SYMBOL SET #01: TEST YOURSELF 0035

Congratulations!	You now know the definitions of the symbols of Set #01. You have completed your first study of all 7 symbols.
Rest	Relax. A rest between learning tasks makes you a better learner. Think of something relaxing for a moment or two. Then...

Go to 0036

PRACTICE_DEFINING_ALL_SYMBOLS 0036

Overview	Now you will practice recalling all 7 symbols in a single exercise.
Directions	Read all the directions before starting the excerise. 1. Recall the definitions of each symbol in the exercise on frame 0037 2. WRITE your first impression of each symbol's definition. 3. Recall the memory aid if the definition is difficult to remember. Then recall the definition. 4. Check your answers only if you are in doubt.

Go to 0037

PRACTICE DEFINING ALL SYMBOLS 0037

Practice	(Symbol 1)	(Symbol 5)	(Symbol 4)
Symbols	(Symbol 4)	(Symbol 6)	(Symbol 2)
	(Symbol 2)	(Symbol 3)	(Symbol 7)
	(Symbol 7)	(Symbol 7)	(Symbol 5)
	(Symbol 4)	(Symbol 3)	(Symbol 5)
	(Symbol 6)	(Symbol 2)	(Symbol 1)
	(Symbol 1)	(Symbol 5)	(Symbol 6)
	(Symbol 3)	(Symbol 2)	(Symbol 1)
	(Symbol 1)	(Symbol 5)	(Symbol 6)
	(Symbol 6)	(Symbol 4)	(Symbol 7)
	(Symbol 7)	(Symbol 5)	(Symbol 7)
	(Symbol 4)	(Symbol 7)	(Symbol 1)
	(Symbol 3)	(Symbol 2)	(Symbol 1)
	(Symbol 1)	(Symbol 6)	(Symbol 5)

To check Answers Go to 0038

PRACTICE DEFINING ALL SYMBOLS 0038

Symbols	Answers
(Symbol 1)	(Definition of symbol 1)
(Symbol 2)	(Definition of symbol 2)
(Symbol 3)	(Definition of symbol 3)
(Symbol 4)	(Definition of symbol 4)
(Symbol 5)	(Definition of symbol 5)
(Symbol 6)	(Definition of symbol 6)
(Symbol 7)	(Definition of symbol 7)

Go to 0039

PRACTICE DEFINING ALL SYMBOLS 0039

Directions

1. If you gave the definitions of all of these symbols correctly without pausing... Go to 0041

2. If you paused in defining some of the symbols or you could not think of their definitions at all... Go to 0040

PRACTICE DEFINING ALL SYMBOLS 0040

Directions

1. Keep practicing until you can define all the symbols without pausing.
2. Practice defining the most difficult symbols for you more than the easier symbols.
3. Change the order of going through the practice symbol list as you study.

Examples of how you might vary the order of studying the symbol codes in the list:

```
----->    <-----    ----->    <-----
<-----    ----->    ----->    <-----
----->    <-----    ----->    <-----
```

To practice... Go back to 0037

After practicing... Go to 0041

CRITERION TEST 0041

Ready?	You should now be ready to take the criterion test.
Directions	1. WRITE the definition of each test symbol. 2. Do not check your answers until you have completed the entire test. 3. To be correct your answer must contain: (1) the concepts and (2) the important words in the definition.

For test symbols Go to 0042

CRITERION TEST #01 0042

1. (Symbol 3) _________
2. (Symbol 4) _________
3. (Symbol 6) _________
4. (Symbol 2) _________
5. (Symbol 1) _________
6. (Symbol 5) _________
7. (Symbol 7) _________

Go to 0043

CRITERION_TEST_#01 0043

Symbols	Answers
1. (Symbol 3)	(Definition of symbol 3)
2. (Symbol 4)	(Definition of symbol 4)
3. (Symbol 6)	(Definition of symbol 6)
4. (Symbol 2)	(Definition of symbol 2)
5. (Symbol 1)	(Definition of symbol 1)
6. (Symbol 5)	(Definition of symbol 5)
7. (Symbol 7)	(Definition of symbol 7)

Go to 0044

CRITERION TEST #01 0044

End of Test Directions	* If you correctly defined all of the symbols... Go to 0045
	* If you missed one or more answers: 1.Make a list of symbols that you missed. 2.Go back to practicing the symbols, paying special attention to the ones you missed...

Go to 0036

CONGRATULATIONS! ________________________________ 0045

You have shown that you know all of the symbols in this program.

Knowing these symbols will make you a better (Name of job/position).

Go to 0046

SUGGESTIONS FOR REFRESHER TRAINING 0046

People Forget	You will need to refresh your memory once in a while if you are to recognize these symbols on-the-job.
Suggestions	1. Review the symbols before you go to bed TONIGHT. 2. Review them again in ONE WEEK. 3. If you seldom use these symbols on-the-job, review them EVERY MONTH.

Go to 0047

SUGGESTIONS_FOR_REFRESHER_TRAINING________________ 0047

Suggestions

4. Refresh your memory while you still remember. Don't wait until you forget. This will be easier than learning these symbols again after you have forgotten them.

5. Check for accuracy during refresher exercises. Your memory plays tricks on you. Use the criterion test first, if it is available.

6. Refresh your memory of the definitions of these symbols more often than is needed to just get by.

END OF PROGRAM

INDEX -- 0048

Page Address

Introduction 0002

Optional Criterion Test 0005

Organization of Learning Program 0011

Symbol Sets:

Symbol Set #001 0012

(Symbol 1) (Symbol 2) (Symbol 3)

(Symbol 4) (Symbol 5) (Symbol 6)

(Symbol 7)

Practicing All Symbols 0036

To Continue Go to 0049

INDEX____ 0049

	Page Address
Criterion Tests	0041
Suggestions For Refresher Training	0046

End of Index

AUTHOR System

Phase II

Data Base Display

Version: 2.0

1.1 Title:

<line> <line> <line> (Title)

1.2 Subtitle:

(Subtitle)

1.3 Author(s):

(Author's Name) <line> <line> <line>

1.4 Date:

(Date of Publication)

1.5 Organization:

(Organization/Publisher)

2.0 Learning Objective:

<line> <line> <space> <OS> (Learning Objective)

3.1 Importance of Symbols:

<line> <line> (Reason for learning to recognize symbols)

<line> <line>

3.2 How the Skill Will be Used:

<line> (List of tasks requiring knowledge of symbols)

4.1 Name of the User:

(Name of job/position)

4.2 Type of Symbol:

(Name of symbol set)

4.3 Official Source of Reference:

(Source)

5.1 Example of Symbols:

<line> <line> <line> <line> <space> <10> (Example)

6.1 Description of Symbols: 001 0001

Set Name: Symbol Set #001

Set #: 001 Symbol #: 0001

Symbol Code: 00 Symbol: (Symbol 1)

Definition:

(Definition of symbol 1)

Memory Aid:

(Memory aid 1)

Similar Symbols:

01. NONE

6.1 Description of Symbols: 001 0002

Set Name: Symbol Set #001

Set #: 001 Symbol #: 0002

Symbol Code: 00 Symbol: (Symbol 2)

Definition:

(Definition of symbol 2)

Memory Aid:

(Memory aid 2)

Similar Symbols:

01. NONE

6.1 Description of Symbols: 001 0003

Set Name: Symbol Set #001

Set #: 001 Symbol #: 0003

Symbol Code: 00 Symbol: (Symbol 3)

Definition:

(Definition of symbol 3)

Memory Aid:

(Memory aid 3)

Similar Symbols:

01. 0004

6.1 Description of Symbols: 001 0004

Set Name: Symbol Set #001

Set #: 001 Symbol #: 0004

Symbol Code: 00 Symbol: (Symbol 4)

Definition:

(Definition of symbol 4)

Memory Aid:

(Memory aid 4)

Similar Symbols:

01. NONE

6.1 Description of Symbols: 001 0005

Set Name: Symbol Set #001

Set #: 001 Symbol #: 0005

Symbol Code: 00 Symbol: (Symbol 5)

Definition:

(Definition of symbol 5)

Memory Aid:

(Memory aid 5)

Similar Symbols:

01. NONE

6.1 Description of Symbols: 001 0006

Set Name: Symbol Set #001

Set #: 001 Symbol #: 0006

Symbol Code: 00 Symbol: (Symbol 6)

Definition:

(Definition of symbol 6)

Memory Aid:

(Memory aid 6)

Similar Symbols:

01. NONE

6.1 Description of Symbols: 001 0007

Set Name: Symbol Set #001

Set #: 001 Symbol #: 0007

Symbol Code: 00 Symbol: (Symbol 7)

Definition:

(Definition of symbol 7)

Memory Aid:

(Memory aid 7)

Similar Symbols:

01. NONE

APPENDIX C

PROGRAMMED TEXT PRODUCED USING AUTHOR ROUTINES AND MINOR OFF-LINE EDITING

The Plain Language Terminal Forecast (PLATF) Code programmed text was produced by TAEG and the Naval Weather Service Facility, Pensacola, using AUTHOR and reproduced in both paper and microfiche forms.

After the basic text was automatically composed and typed, the paper manuscript was edited slightly. This included adding a new title page, preface, subscripts, and appendix A.

It has been distributed to all U.S. Naval Weather Service Centers, Facilities, and Detachments. These users have evaluated it and found it to be useful training material.

THE PLAIN LANGUAGE TERMINAL FORECAST (PLATF) CODE

PREFACE

This is a computer-formated programmed instruction. The computer software, used in developing this self-paced package, was specifically designed by the Training Analysis and Evaluation Group (TAEG), Orlando, Florida, for codes which must be memorized by the users because of the frequent need for instant recall.

Each page in the program has been assigned a microfiche-card row and column designation in the upper right margin, which is used with the instructions in the lower right margin. An Arabic numeral at the bottom of each page is used to designate regular page numbers.

NAVWEASERVCOMINST 3143.1( ), "Plain Language Terminal Forecast (PLATF) Code," was the reference used in the development of this training package and is included in this program as Appendix A. The PLATF is similar to the METAR and TAF codes which are contained in the publication NAVAIR 50-1P-11, "International Meteorological Codes 1974 and Worldwide Synoptic Broadcasts."

Now, begin the program.

This programmed instruction was prepared by:

TRAINING ANALYSIS AND EVALUATION GROUP (TAEG)
ORLANDO, FLORIDA

and

NAVWEASERVFAC PENSACOLA

September 1977

Go to 1A04

INTRODUCTION

Learning Objective

After completing this lesson you will be able to recall the meaning of each element (letter group and abbreviation) in the symbolic form of the PLATF.

This lesson will help you learn easily and quickly.

FOR BEST RESULTS, FOLLOW THE DIRECTIONS.

Index

When you need an index to locate parts of the program... Go to 1E12

To continue Go to 1A05

IMPORTANCE OF THIS PROGRAM TO YOU

Importance of Symbols

The PLATF is transmitted every 6 hours. It is used on a continuing basis by the forecasters at all Naval Air Stations. Therefore, it is imperative that the Aerographer's Mate recognize these symbols at a glance.

How Skill Will be Used

This program will help you to:

** encode a PLATF for transmission.

** decode the PLATFs for flight forecasts/briefings.

Go to 1A06

EXAMPLE OF HOW THE SYMBOLS ARE USED

Sample Format

The PLATF Message format looks like this:

$G_1G_1G_2G_2$ h_sh_sNVVww ddff (Plain Language) QNH

Each symbolic letter or letter group represents information to be included in the message, such as:

G_1G_1 = start of forecast period in whole hours GMT
G_2G_2 = end of forecast period in whole hours GMT

To continue Go to 1A07

EXAMPLE OF HOW THE SYMBOLS ARE USED

$h_s h_s$ = height of base of each cloud layer above ground

Etc.

Sample Message

A PLATF message based on this coded format might appear like this:

PLATF 1212 25BKN 10 2310 QNH 30.00

Sample Analysis

To determine the meaning of this message, you must compare the coded message format with the letter/number groups in the message.

To continue Go to 1A08

EXAMPLE OF HOW THE SYMBOLS ARE USED

G_1G_1 = 12 = 1200 GMT; the start of forecast period

G_2G_2 = 12 = 1200 GMT the following day, the end of the forecast period

h_sh_s = 25 = 2500 feet, the height of the cloud base above the ground

Etc.

Go to 1A09

SYMBOL PRETEST

Purpose	The pretest will help you decide whether you should try the criterion test at this time.
Directions	1. You may already know some or all of these PLATF letter symbols. 2. Scan through the list below and see how many you can define.
Symbols	h_sh_s * dd * QNH * VCNTY * V * G_1G_1 * GRADU * TEMP * N * FROPA * ff * VV * ww * OCNL * G_2G_2 *

Go to 1A10

OPTIONAL CRITERION TEST

Choose

1. If you think that there are three or more of these symbols that you do not know, don't waste time taking the criterion test. Go directly to the learning program... Go to 1B02

2. If you think you know all the symbols, or you missed only 1 or 2, take the criterion test and see if you can pass it...

Go to 1A11

OPTIONAL CRITERION TEST

Directions

1. Recall the definition of each symbol in the next frame(s).

2. Write each definition on a piece of paper.

3. You must recall the official definition of the symbol to be correct (as found in Naval Weather Service Command Instruction 3143.1( ), Change 2 (see Appendix A -- frame 1E13 -- for a copy).

Go to 1A12

OPTIONAL CRITERION TEST: SYMBOLS

1. N________________
2. ff________________
3. G_1G_1________________
4. h_sh_s________________
5. QNH________________
6. VV________________
7. GRADU________________
8. VCNTY________________
9. FROPA________________
10. OCNL________________
11. G_2G_2________________
12. dd________________
13. ww________________
14. TEMP________________
15. V________________

Go to 1A13

OPTIONAL CRITERION TEST

Directions

1. Check your answers now.
2. Put an X through your wrong answers.

Answers

1. N = Amount of sky cover in each cloud layer (in 1/10ths)
2. ff = velocity of wind in whole knots
3. G_1G_1 = Start of forecast period in whole hours GMT
4. h_sh_s = Height of base of each cloud layer above ground in hundreds of feet
5. QNH = Lowest altimeter setting forecast in inches
6. VV = Visibility in statute miles

To continue Go to 1A14

OPTIONAL CRITERION TEST (continue)

Answers

7. GRADU = GRADUALLY

8. VCNTY = VICINITY

9. FROPA = FRONTAL PASSAGE

10. OCNL = OCCASIONAL

11. G_2G_2 = End of forecast period in whole hours GMT

12. dd = Direction of surface wind in tens of degrees

13. ww = Weather and obstruction to vision

14. TEMP = TEMPORARY

15. V = VARIABLE

Go to 1B01

OPTIONAL CRITERION TEST

Did you pass?

1. Did you miss 3 or less of the symbol definitions? If so, then learn the ones that you missed by studying them on 1A13 and 1A14.

Then Go to 1E09

2. If you missed more than 3 of the symbol definitions, complete this learning program-now...

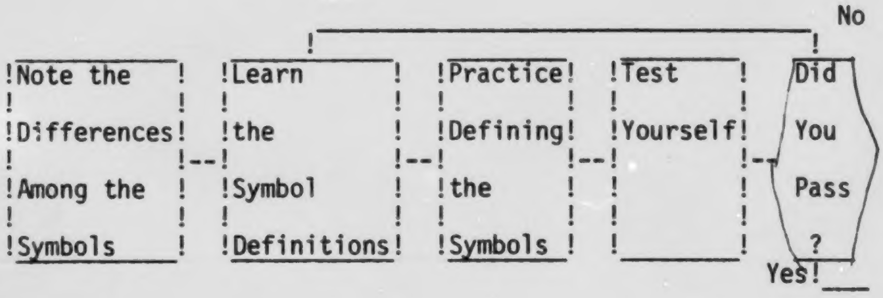
Go to 1B02

ORGANIZATION OF THE LEARNING PROGRAM

Overview

The list of symbols has been divided into 2 practice sets. You will learn each set separately, using the "Steps for Easy Learning." Then you will practice all 15 symbols in the same exercise.

Steps for Easy Learning


No
Note the Differences Among the Symbols
Learn the Symbol Definitions
Practice Defining the Symbols
Test Yourself
Did You Pass ?
Yes

Go to 1B03

SYMBOL SET #01

The symbols in this set are:

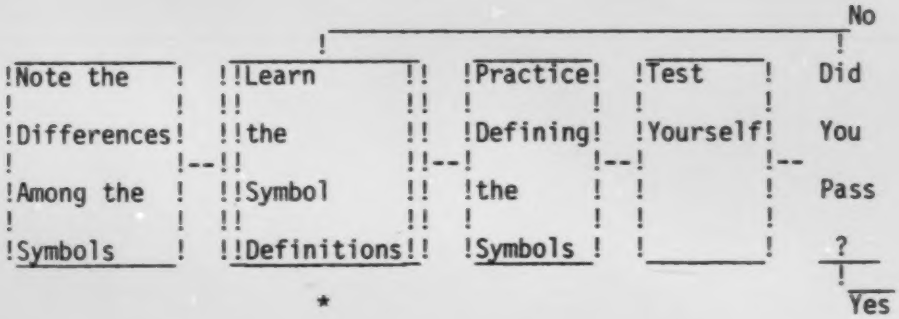
G_1G_1 * G_2G_2 * h_sh_s * N * VV * ww *

dd * ff * QNH *

You will learn to recognize and define these symbols in the next few frames.

Go to 1B04

SYMBOL SET #01: LEARN SYMBOL DEFINITIONS


Note the Differences Among the Symbols
Learn the Symbol Definitions
Practice Defining the Symbols
Test Yourself
Did You Pass ?
No
Yes
*

You are here

Go to 1B05

SYMBOL SET #01: LEARN SYMBOL DEFINITIONS

Directions

1. Look carefully in the next frame at each symbol and its definition.

2. Repeat the definition to yourself as you look at the symbol.

3. Study the memory aid to help you remember the definition.

4. Study each symbol and its definition 2 or 3 times.

Go to 1B06

SYMBOL SET #01: LEARN SYMBOL DEFINITIONS

Definitions	Symbols	Memory Aids
* Start of forecast period in whole hours GMT	G_1G_1	G = GMT 1 = start
* End of forecast period in whole hours GMT	G_2G_2	G = GMT 2 = end
* Height of base of each cloud layer above ground in hundreds of feet	h_sh_s	h = height s = base
* Amount of sky cover in each cloud layer (in 1/10ths)	N	N = Number of 1/10ths

To continue Go to 1B07

1B07

SYMBOL SET #01: LEARN SYMBOL DEFINITIONS (continue)

Definitions	Symbols	Memory Aids
* Visibility in statute miles	VV	Visibility
* Weather and obstruction to vision	ww	weather weather
* Direction of surface wind in tens of degrees	dd	direction of wind
* Velocity of wind in whole knots	ff	force of wind
* Lowest altimeter setting forecast in inches	QNH	INCHES

Go to 1B08

SYMBOL SET #01: REST

Directions	Relax, rest your eyes and your mind for a minute. Think of something relaxing. You'll learn easier if you rest before you continue.

Go to 1B09

1B09

SYMBOL SET #01: PRACTICE DEFINING THE SYMBOLS

```
                                                    No
                 ___________________________________
                 !                                 !
!Note the   !  !Learn      !  !!Practice!!  !Test     !  Did
!           !  !           !  !!        !!  !         !
!Differences!  !the        !  !!Defining!!  !Yourself!  You
!           !--!           !--!!        !!--!         !--
!Among the  !  !Symbol     !  !!the     !!  !         !  Pass
!           !  !           !  !!        !!  !         !
!Symbols    !  !Definitions!  !!Symbols !!  !_________!   ?
                                                          !
                                 *                        Yes

                             You are here
```

Go to 1B10

SYMBOL SET #01: PRACTICE DEFINING THE SYMBOLS

Directions

1. Read all directions before you practice defining the symbols.
2. Try to recall the definition of each symbol in the exercise on frame 1B11.
3. Write your first impression of the symbol's definition.
4. If the definition is difficult to remember, recall the memory aid first, then recall the definition.
5. Check your answer immediately in the answer section below the symbols.

Go to 1B11

SYMBOL SET #01: PRACTICE DEFINING THE SYMBOLS

Practice Symbols	
	G_1G_1 * h_sh_s * G_2G_2 * G_1G_1 * G_2G_2 *
	G_1G_1 * h_sh_s * G_2G_2 * G_1G_1 * G_2G_2 *
	G_1G_1 * h_sh_s * G_2G_2 * G_1G_1 * h_sh_s
	h_sh_s * G_2G_2 * G_1G_1 * G_2G_2 * G_1G_1 *
	G_2G_2 * G_1G_1 * h_sh_s * h_sh_s * G_1G_1 *

Symbols	Definitions
G_1G_1	* Start of forecast period in whole hours GMT
G_2G_2	* End of forecast period in whole hours GMT
h_sh_s	* Height of base of each cloud layer above ground in hundreds of feet

To continue Go to 1B12

SYMBOL SET #01: PRACTICE DEFINING THE SYMBOLS

Practice	ww * VV * N * dd * ff * ff * N * VV *
Symbols	ww * dd * ff * ww * dd * VV * N *
	ff * ww * dd * N * N * ww * VV * ff *
	dd * N * ww * dd * VV * ff * N * ww *
	dd * VV * ff * VV * ff * N * dd *

Symbols	Definitions
N	* Amount of sky cover in each cloud layer (in 1/10ths)
VV	* Visibility in statute miles
ww	* Weather and obstruction to vision
dd	* Direction of surface wind in tens of degrees
ff	* Velocity of wind in whole knots

To continue Go to 1B13

SYMBOL SET #01: PRACTICE DEFINING THE SYMBOLS

Practice Symbols

ff * N * QNH * ff * N * QNH * QNH *
N * QNH * ff * N * ff * QNH * N *
QNH * N * ff * N * QNH * N * ff *
N * QNH * ff * ff * N * QNH * N *
QNH * N * ff * QNH * QNH * N * ff *

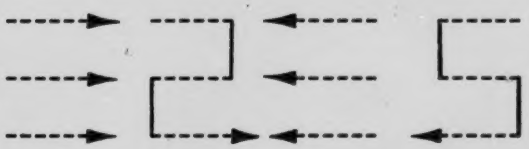
Symbols	Definitions
QNH	* Lowest altimeter setting forecast in inches
N	* Amount of sky cover in each cloud layer (in 1/10ths)
ff	* Velocity of wind in whole knots

Go to 1B14

SYMBOL SET #01: PRACTICE DEFINING THE SYMBOLS

Directions

1. Keep practicing until you can define all the symbols without pausing.
2. Practice defining the most difficult symbols for you more than the easier symbols.
3. Change the order of going through the practice symbol list as you study. Examples of how you might vary the order of studying the symbol codes in the list:



To practice... Go back to 1B11

After practicing... Go to 1C01

SYMBOL SET #01: WANT TO REST?

Yes

If you are tired now, get your mind off studying symbols.

Relax for a minute!

After your minute's rest...

Go to 1C02

No

If you do not want to rest now...

Go to 1C02

SYMBOL SET #01: TEST YOURSELF

```
                         __________________________________________No
                        !                                           !
 _____________     _____________     _________     _____________   ____
!Note the     !   !Learn        !   !Practice!   !!Test        !!   Did
!             !   !             !   !        !   !!            !!
!Differences  !   !the          !   !Defining!   !!Yourself    !!   You
!             !--!              !--!         !--!!             !!--
!Among the    !   !Symbol       !   !the     !   !!            !!   Pass
!             !   !             !   !        !   !!            !!
!Symbols______!   !Definitions__!   !Symbols_!   !!____________!!   _?__
                                                                    !
                                                       *            Yes

                                                  You are here
```

Go to 1C03

SYMBOL SET #01: TEST YOURSELF

Directions

1. Write the definition of each symbol when you take the self test.

2. If you want a memory aid...

Go to 1C04

3. Refer to the memory aids only when you can't think of the definition.

Self Test

1. G_1G_1
2. G_2G_2
3. h_sh_s
4. N
5. VV
6. ww
7. dd
8. ff
9. QNH

For Answers... Go to 1C05

SYMBOL SET #01: TEST YOURSELF

	Symbols	Memory Aids
1.	G_1G_1	G = GMT 1 = start
2.	G_2G_2	G = GMT 2 = end
3.	h_sh_s	h = height s = base
4.	N	N = Number of 1/10ths
5.	VV	Visibility
6.	ww	weather weather
7.	dd	direction of wind
8.	ff	force of wind
9.	QNH	INCHES

Go Back to 1C03

SYMBOL SET #01: TEST YOURSELF

Symbols	Answers
1. G_1G_1	* Start of forecast period in whole hours GMT
2. G_2G_2	* End of forecast period in whole hours GMT
3. h_sh_s	* Height of base of each cloud layer above ground in hundreds of feet
4. N	* Amount of sky cover in each cloud layer (in 1/10ths)
5. VV	* Visibility in statute miles
6. ww	* Weather and obstruction to vision
7. dd	* Direction of surface wind in tens of degrees
8. ff	* Velocity of wind in whole knots

To continue Go to 1C06

SYMBOL SET #01: TEST YOURSELF (continue)

Symbols	Answers
9. QNH	* Lowest altimeter setting forecast in inches

Go to 1C07

SYMBOL SET #01: TEST YOURSELF

End of Test Directions

1. If you referred to any memory aids during this test, or if you missed one or more definitions, you need to continue to practice:

   - skip symbols you already know
   - start with the most difficult symbols for you
   - do the self test after you practice each time

   To Practice... Go Back to 1B11

2. If you correctly defined all the symbols...

   Go to 1C08

SYMBOL SET #01: TEST YOURSELF

Congratulations!	You now know the definitions of the symbols of Set #01.
	You have completed your first study of this set of symbols.

Rest	Relax. A rest between learning tasks makes you a better learner.
	Think of something relaxing for a moment or two. Then...

Go to 1C09

SYMBOL SET #02

The symbols in this set are:

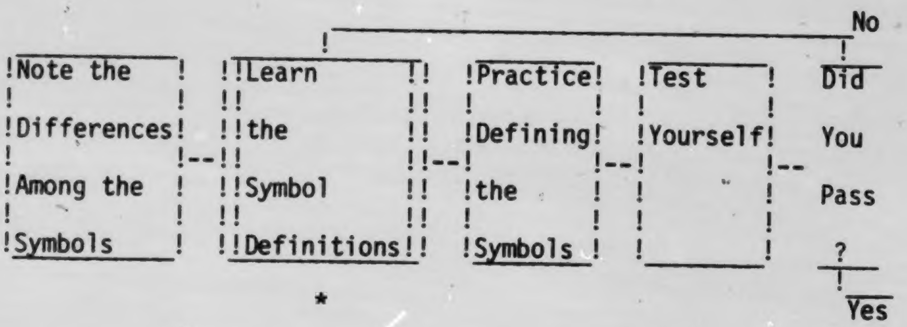
OCNL * TEMP * VCNTY * GRADU * FROPA

* V *

You will learn to recognize and define these symbols in the next few frames.

Go to 1C10

SYMBOL SET #02: LEARN SYMBOL DEFINITIONS


Note the Differences Among the Symbols
Learn the Symbol Definitions
Practice Defining the Symbols
Test Yourself
Did You Pass ?
No
Yes
*

You are here

Go to 1C11

SYMBOL SET #02: LEARN SYMBOL DEFINITIONS

Directions

1. Look carefully in the next frame at each symbol and its definition.

2. Repeat the definition to yourself as you look at the symbol.

3. Study the memory aid to help you remember the definition.

4. Study each symbol and its definition 2 or 3 times.

Go to 1C12

SYMBOL SET #02: LEARN SYMBOL DEFINITIONS

Definitions	Symbols	Memory Aids
* OCCASIONAL	OCNL	OCCASIONAL
* TEMPORARY	TEMP	TEMPORARY
* VICINITY	VCNTY	VICINITY
* GRADUALLY	GRADU	GRADUALLY
* FRONTAL PASSAGE	FROPA	FRONTAL PASSAGE
* VARIABLE	V	VARIABLE

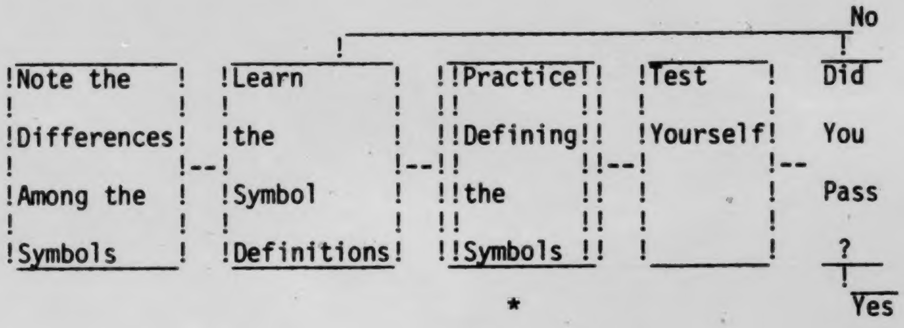
Go to 1C13

SYMBOL SET #02: REST

Directions	Relax, rest your eyes and your mind for a minute. Think of something relaxing. You'll learn easier if you rest before you continue.

Go to 1C14

SYMBOL SET #02: PRACTICE DEFINING THE SYMBOLS


No
Note the Differences Among the Symbols
Learn the Symbol Definitions
Practice Defining the Symbols
Test Yourself
Did You Pass ?
Yes
*

You are here

Go to 1D01

SYMBOL SET #02: PRACTICE DEFINING THE SYMBOLS

Directions

1. Read all directions before you practice defining the symbols.
2. Try to recall the definition of each symbol in the exercise on frame 1D02.
3. Write your first impression of the symbol's definition.
4. If the definition is difficult to remember, recall the memory aid first, then recall the definition.
5. Check your answer immediately in the answer section below the symbols.

Go to 1D02

SYMBOL SET #02: PRACTICE DEFINING THE SYMBOLS

Practice	V * VCNTY * GRADU * OCNL * FROPA *
Symbols	OCNL * VCNTY * GRADU * TEMP * V *
	GRADU * FROPA * VCNTY * OCNL * V *
	VCNTY * GRADU * TEMP * V * FROPA *
	OCNL * VCNTY * GRADU * TEMP * V *

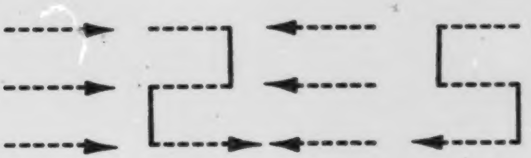
Symbols	Definitions
OCNL	* OCCASIONAL
TEMP	* TEMPORARY
VCNTY	* VICINITY
GRADU	* GRADUALLY
FROPA	* FRONTAL PASSAGE
V	* VARIABLE

Go to 1D03

SYMBOL SET #02: PRACTICE DEFINING THE SYMBOLS

Directions

1. Keep practicing until you can define all the symbols without pausing.
2. Practice defining the most difficult symbols for you more than the easier symbols.
3. Change the order of going through the practice symbol list as you study. Examples of how you might vary the order of studying the symbol codes in the list:



To practice... Go back to 1D02

After practicing... Go to 1D04

SYMBOL SET #02: WANT TO REST?

Yes	If you are tired now, get your mind off studying symbols. Relax for a minute! After your minute's rest... Go to 1D05
No	If you do not want to rest now... Go to 1D05

SYMBOL SET #02: TEST YOURSELF

```
                       _______________________________No
                      !                               !
 ____________      ___________     _________     ___________     ____
!Note the    !    !Learn      !   !Practice!   !!Test      !!    Did
!            !    !           !   !        !   !!          !!
!Differences!    !the        !   !Defining!   !!Yourself!!    You
!            !--!            !--!        !--!!          !!--
!Among the   !    !Symbol     !   !the     !   !!          !!    Pass
!            !    !           !   !        !   !!          !!
!Symbols____ !    !Definitions!   !Symbols_!   !!__________!!    _?_
                                                                  !
                                                  *              Yes

                                          You are here
```

Go to 1D06

SYMBOL SET #02: TEST YOURSELF

Directions	1. Write the definition of each symbol when you take the self test.
	2. If you want a memory aid... Go to 1D07
	3. Refer to the memory aids only when you can't think of the definition.

Self Test

1. OCNL
2. TEMP
3. VCNTY
4. GRADU
5. FROPA
6. V

For Answers... Go to 1D08

SYMBOL SET #02: TEST YOURSELF

Symbols	Memory Aids
1. OCNL	OCCASIONAL
2. TEMP	TEMPORARY
3. VCNTY	VICINITY
4. GRADU	GRADUALLY
5. FROPA	FRONTAL PASSAGE
6. V	VARIABLE

Go Back to 1D06

SYMBOL SET #02: TEST YOURSELF

Symbols		Answers
1.	OCNL	* OCCASIONAL
2.	TEMP	* TEMPORARY
3.	VCNTY	* VICINITY
4.	GRADU	* GRADUALLY
5.	FROPA	* FRONTAL PASSAGE
6.	V	* VARIABLE

Go to 1D09

SYMBOL SET #02: TEST YOURSELF

End of Test Directions

1. If you referred to any memory aids during this test, or if you missed one or more definitions, you need to continue to practice:

    - skip symbols you already know
    - start with the most difficult symbols for you
    - do the self test after you practice each time

To Practice... Go Back to 1D02

2. If you correctly defined all the symbols...

Go to 1D10

SYMBOL SET #02: TEST YOURSELF

Congratulations!	You now know the definitions of the symbols of Set #02. You have completed your first study of all 15 symbols.
Rest	Relax. A rest between learning tasks makes you a better learner. Think of something relaxing for a moment or two. Then...

Go to 1D11

PRACTICE DEFINING ALL SYMBOLS

Overview	Now you will practice recalling all 15 symbols in a single exercise.
Directions	Read all the directions before starting the exercise. 1. Recall the definitions of each symbol in the exercise in frame 1D12. 2. Write your first impression of the symbol's definition. 3. Recall the memory aid if the definition is difficult to remember. Then recall the definition. 4. Check your answers only if you are in doubt.

Go to 1D12

PRACTICE DEFINING ALL SYMBOLS

Practice Symbols

VV * GRADU * dd * VCNTY * N * G_1G_1 *

OCNL * ww * h_sh_s * ww * OCNL * G_1G_1 *

N * VV * h_sh_s * VCNTY * GRADU * dd *

N * VV * OCNL * GRADU * dd * G_1G_1 *

h_sh_s * ww * VCNTY * VV * h_sh_s * ww *

OCNL * VCNTY * GRADU * G_1G_1 * N *

dd * h_sh_s * G_1G_1 * N * OCNL * dd *

ww * VCNTY * VV * GRADU * OCNL * N *

VV * GRADU * G_1G_1 * VCNTY * h_sh_s *

ww * dd * GRADU * ww * OCNL * VV *

G_1G_1 * N * VCNTY * h_sh_s * dd * G_1G_1 *

OCNL * ww * VCNTY * h_sh_s * GRADU *

dd * VV * N * h_sh_s * N * VCNTY * dd *

GRADU * G_1G_1 * VV * ww * OCNL *

To check Answers Go to 1D13

PRACTICE DEFINING ALL SYMBOLS

Symbols	Answers
G_1G_1	* Start of forecast period in whole hours GMT
h_sh_s	* Height of base of each cloud layer above ground in hundreds of feet
N	* Amount of sky cover in each cloud layer (in 1/10ths)
VV	* Visibility in statute miles
ww	* Weather and obstruction to vision
dd	* Direction of surface wind in tens of [illegible]ees
OCNL	* OCCASIONAL
VCNTY	* VICINITY
GRADU	* GRADUALLY

To continue Go to 1D14

PRACTICE DEFINING ALL SYMBOLS

Practice Symbols

G_2G_2 * ff * QNH * TEMP * ww * FROPA *

V * ww * G_2G_2* ff * FROPA * QNH *

TEMP * V * TEMP * G_2G_2 * ww * QNH *

FROPA * ff * V * ff * G_2G_2 * FROPA *

ww * V * QNH * TEMP * FROPA * QNH *

G_2G_2 * ff * ww * TEMP * V * G_2G_2 *

ww * ff * FROPA * V * QNH * TEMP *

ww * FROPA * ff * TEMP * V * G_2G_2 *

QNH * ww * G_2G_2 * FROPA * TEMP * V *

QNH * ff * TEMP * QNH * FROPA * V *

ff * ww * G_2G_2 * FROPA * ff * ww *

QNH * G_2G_2 * V * TEMP * TEMP * QNH *

G_2G_2 * ww * ff * V * FROPA * QNH *

ww * G_2G_2 * ff * FROPA * TEMP * V *

To check Answers Go to 1E01

PRACTICE DEFINING ALL SYMBOLS

Symbols	Answers
G_2G_2	* End of forecast period in whole hours GMT
ww	* Weather and obstruction to vision
ff	* Velocity of wind in whole knots
QNH	* Lowest altimeter setting forecast in inches
TEMP	* TEMPORARY
FROPA	* FRONTAL PASSAGE
V	* VARIABLE

Go to 1E02

1E02

PRACTICE DEFINING ALL SYMBOLS

Directions

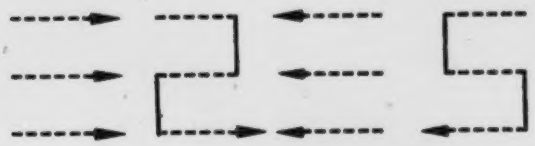
1. If you gave the definitions of all of these symbols correctly without pausing... Go to 1E04

2. If you paused in defining some of the symbols or you could not think of their definitions at all... Go to 1E03

PRACTICE DEFINING ALL SYMBOLS

Directions

1. Keep practicing until you can define all the symbols without pausing.
2. Practice defining the most difficult symbols for you more than the easier symbols.
3. Change the order of going through the practice symbol list as you study. Examples of how you might vary the order of studying the symbol codes in the list:



To practice... Go back to 1D12

After practicing... Go to 1E04

CRITERION TEST

Ready?	You should now be ready to take the criterion test.
Directions	1. Write the definition of each test symbol. 2. Do not check your answers until you have completed the entire test.

For test symbols Go to 1E05

CRITERION TEST #01

1. dd________________

2. VV________________

3. N________________

4. ww________________

5. TEMP______________

6. GRADU_____________

7. V________________

8. QNH_______________

9. G_2G_2______________

10. G_1G_1______________

11. OCNL______________

12. VCNTY_____________

13. h_sh_s______________

14. ff________________

15. FROPA_____________

Go to 1E06

CRITERION TEST #01

Answers

1. dd = Direction of surface wind in tens of degrees
2. VV = Visibility in statute miles
3. N = Amount of sky cover in each cloud layer (in 1/10ths)
4. ww = Weather and obstruction to vision
5. TEMP = TEMPORARY
6. GRADU = GRADUALLY
7. V = VARIABLE
8. QNH = Lowest altimeter setting forecast in inches
9. G_2G_2 = End of forecast period in whole hours GMT

To continue Go to 1E07

CRITERION TEST #01 (continue)

Answers

10. G_1G_1 = Start of forecast period in whole hours GMT

11. OCNL = OCCASIONAL

12. VCNTY = VICINITY

13. h_sh_s = Height of base of each cloud layer above ground in hundreds of feet

14. ff = velocity of wind in knots

15. FROPA = FRONTAL PASSAGE

Go to 1E08

CRITERION TEST #01

End of Test Directions

* If you correctly defined all of the symbols... Go to 1E09
* If you missed one or more answers:
  1. Make a list of symbols that you missed.
  2. Go back to practicing all the symbols...

Go to 1D12

CONGRATULATIONS!

You have shown that you know all of the symbols in this program.

Knowing these symbols will make you a better Aerographer's Mate.

Go to 1E10

INDEX

Fiche Frame

Introduction - 1A04

Symbol Pretest - 1A09

Optional Criterion Test - - - - - - - - - - - - - - - - 1A11

Organization of Learning Program - - - - - - - - - - - 1B02

Symbol Sets:

Symbolic Letter Groups:

G_1G_1 * G_2G_2 * h_sh_s * N * VV * ww * dd
* ff * QNH * - - - - - - - - - - - - - - - - - 1B06

Plain Language Abbreviations:

OCNL * TEMP * VCNTY * GRADU * FROPA *
V * - 1C12

Practicing All Symbols - - - - - - - - - - - - - - - - - 1D12

Criterion Test - 1E04

Suggestions For Refresher Training - - - - - - - - - - 1E10

End of Index

SUGGESTIONS FOR REFRESHER TRAINING

People Forget

You will need to refresh your memory once in a while if you are to recognize these symbols on-the-job.

Suggestions

1. Review the symbols before you go to bed TONIGHT.
2. Review them again in ONE WEEK.
3. If you seldom use these symbols on-the-job, review them EVERY MONTH.

Go to 1E11

SUGGESTIONS FOR REFRESHER TRAINING

Suggestions

4. Refresh your memory while you still remember. Don't wait until you forget. This will be easier than learning these symbols again after you have forgotten them.

5. Check for accuracy during refresher exercises. Your memory plays tricks on you. Use the criterion test first, if it is available.

6. Refresh your memory of the definitions of these symbols more often than is needed to just get by.

END OF PROGRAM

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DEPARTMENT OF THE NAVY
HEADQUARTERS NAVAL WEATHER SERVICE COMMAND
WASHINGTON, D.C. 20390

NAVWEASERVCOMINST 3143.1A
Ser 3031
16 Nov 1972

NAVWEASERVCOM INSTRUCTION 3143.1A

From: Commander, Naval Weather Service Command

Subj: Plain Language Terminal Forecast Code (PLATF)

Ref: (a) NAVAIR 50-1P-11 (NOTAL)
(b) AWSM 105-24 (NOTAL)
(c) AFCSM 105-2, (Series) (NOTAL)

Encl: (1) Coding Instructions for the PLATF

1. Purpose. To promulgate information on the use and coding of the Plain Language Terminal Forecast Code (PLATF).

2. Cancellation. This instruction supersedes and cancels NAVWEASERVCOM Instruction 3143.1.

3. Background. Countries using metric measurements in the AERO and WMO Aerodrome forecast codes have adopted the METAR (FM15.D) and TAF (FM 51.D) codes. The METAR and TAF codes are contained in reference (a). Air Weather Service Units have adopted a modified version of the TAF code which is contained in the latest edition of reference (b). The PLATF code will continue to be used by Naval Weather Service and Marine Corps activities. Because of the similarity of the PLATF code and an aviation observation, with which pilots are familiar, the PLATF can be used as a ready tool in pilot briefings. This similarity also enhances its simplicity and ease of preparation. The PLATF is also very similar to the National Weather Service Airways Forecast (Terminal) code which is used extensively for pilot briefing in CONUS.

4. Action. Naval Weather Service and Marine Corps Units will continue to use the PLATF. However, Naval Weather Service and Marine Corps Units now using metric codes in response to local or national agreements and/or transmitting data via longline on international (non-DOD) circuitry, should adopt TAF codes. The terminal forecasts will have a valid period of 24 hours and will be filed at six hour intervals at the times specified in the revised schedules of reference (c). Units utilizing the PLATF will follow coding criteria and guidance contained in enclosure (1).

5. Concurrence. This instruction has the concurrence of the Commandant of the Marine Corps. Marine Corps aviation activities shall take those

actions prescribed in this instruction which are not contradictory to specifically expressed policies of the Commandant of the Marine Corps.

/s/ R. M. Cassidy

R. M. CASSIDY

Distribution: (Intentionally omitted from this appendix)

CODING INSTRUCTIONS FOR PLAIN LANGUAGE TERMINAL FORECAST (PLATF)

PLATF Format: $G_1G_1G_2G_2$ h_sh_sNVVww ddff (Plain Language) QNH

These instructions apply to the Plain Language Terminal Forecast (PLATF) code currently used by the Naval Weather Service (NAVWEASERV) in the United States. The form and content of the code have been designed to include the necessary meteorological information for the safe operation and flight planning of aircraft landing and taking off at an air base. The code is based on the National Weather Service AVIATION FORECAST (TERMINAL) code and generally employs the same abbreviations and form used in the airways hourly observation code to be found in the Federal Meteorological Handbook Number 1 (FMH-1), Surface Observations. (D

a. Heights (h_sh_s). The heights of cloud bases will be indicated in hundreds of feet above the ground. Between the surface and 5000 feet, heights will be expressed to the nearest 100 feet; from 5000 to 25,000 feet in 1000 feet intervals; and intervals of 5,000 feet above 25,000 feet.

(1) The heights of cloud bases and cloud layers will include surface based obscuring phenomena such as heavy snow, smoke, or fog which are expected to restrict the vertical visibility to less than the height of the base of the lowest cloud layer. (Refer to FMH-1 on reporting of obscured sky.)

b. Sky Cover (N). Cloud layers will be written in ascending order of height separated by a space (scattered 1/10-5/10) (broken 6/10-9/10) and (overcast 10/10). All units will use plain language abbreviations (CLR, SCT, BKN, OVC). A surface based obscuring phenomena such as snow, smoke, or fog, that is expected to reduce the vertical visibility to less than the height of the lowest layer of cloud will be indicated by the symbol X or -X. The height will be the forecast vertical visibility; e.g. 5X1/4S+ (R

(1) The term variable (V) will be used in the REMARKS section when two or more cloud conditions are expected alternately. The predominate cloud cover condition will be included in the main text and the variable condition listed in the REMARKS.

Example: PLATF 0909 8BKN 50OVC 3R-F 1810 BKN V OVC QNH 30.01 (R
12Z 5X1/2S 3215 QNH 30.02

This forecast is for a predominate ceiling of 800 feet broken but variable at time to overcast with the sky condition expected to become obscured at 500 feet in snow after 1200Z.

Enclosure (1)

c. Ceiling. The base of the lowest layer of clouds forecast to have more than five-tenths coverage will constitute the ceiling. Where two or more layers of scattered clouds are forecast even though their cumulative amount is ten-tenths, the sky will be considered as scattered. The rule of summation used in observations will not apply. The "C" identifier for ceiling will not be used by NAVWEASERV forecasters.

d. Visibility (VV). The visibility term will follow the cloud cover group and will be forecast to the nearest reportable value in miles or fractions of miles as listed in table A3-4, FMH-1. A range of visibility (e.g. 3-5H) will not be forecast. Variable visibility will be described in the REMARKS section.

R) Example: PLATF 1212 8OVC 2R-F 1210 QNH 30.00
14Z 5OVC 3/4R-F 1815 VSBY 1/2V1 QNH 29.99

The visibility is forecast to be 2 miles in light rain and fog decreasing to 3/4 mile after 1400Z. During this latter period the visibility is forecast to be variable between 1/2 and 1 mile.

e. Weather and Obstructions to Vision. Standard letters, symbols, or abbreviations contained in FMH-1 will be used to indicate the state of weather or obstructions to vision and will follow the visibility figure without a space. Intensities will be denoted by a plus sign (+) for heavy, minus sign (-) for light. Thunderstorms will be carried as "T". If the visibility is forecast to be six miles or less, a state of weather or obstruction to vision must be included.

f. Surface Wind. The surface wind group will follow the terms for weather and obstructions to visibility and will be forecast when the wind is expected to be five knots or more. If the wind is forecast less than five knots, the abbreviation "C" for calm will be used. Wind will be separated by one space from the previous group. The wind will be reported in the direction from which the wind is blowing measured clockwise from true north. Speed is forecast in knots. Wind direction will be written in degrees to the nearest ten degree increment. Gusts wind will be identified by the letter "G" following the wind speed.

Example: 2315G30

g. Remarks. Meteorological conditions considered to be of importance and not adequately covered in the general group will be carried in the remarks section using authorized contractions and symbols where possible. Modifying remarks will normally apply to visibility, sky cover, or winds. The following terms may apply in defining the changeable weather conditions.

(1) OCCASIONAL (OCNL). This term is used to modify a general condition with temporary changes occurring no more than once or twice during the forecast period to which the general condition applies and lasting considerably less than one-half the total time.

Example: PLATF 1212 30BKN 15 3215 OCNL 12BKN 3SW- QNH 30.02 (R

The general forecast is for a ceiling of 3000 feet broken visibility 15 miles, but once or twice during the forecast period, snow showers are forecast to lower the ceiling to 1200 feet and reduce the visibility to 3 miles. These conditions are expected to last considerably less than one-half the total time.

(2) TEMPORARY (TEMP). The term TEMP is used to modify the general forecast condition when changes are forecast to occur more than once or twice during the forecast period.

Example: PLATF 1212 25OVC 5R--F 1810 TEMP 15OVC 3R-F QNH 30.02 (R

The general forecast is for a ceiling of 2500 feet overcast with visibility 5 miles in very light rain and fog, but the ceiling and visibility are expected to lower to 1500 overcast and 3 miles in light rain and fog for temporary periods more than once or twice during the forecast period.

(3) VICINITY (VCNTY). This term refers to air mass type weather, such as showers, thunderstorms, and patches of ground fog, which are expected to be widely scattered in the general vicinity of the station and it is expected that there is only a slight chance that they will affect the station itself. Lowest ceilings and visibilities expected in the phenomena in the vicinity will be included in the forecast.

Example: PLATF 0909 20BKN 15 2315 15OVC 2TRW VCNTY QNH 29.99 (R

This forecast is for a ceiling of 2000 broken and visibility 15 miles. Thunderstorms are expected in the area with only a slight chance that they will affect the station. Lowest ceiling and visibility expected in the thunderstorms are 1500 feet overcast and 2 miles.

(4) GRADUALLY (GRADU). This term indicates an improving or deteriorating condition during a specific period.

Example: PLATF 1212 25BKN 10 2310 QNH 30.00 (R
GRADU 15-17Z 15OVC 2R-F 2315 QNH 29.99

The forecast for 1200Z is for 2500 feet broken, 10 miles visibility. Between 1500Z and 1700Z the conditions are expected to gradually deteriorate to 1500 overcast with 2 miles visibility in light rain and fog.

(5) FRONTAL PASSAGES (FROPA). Frontal passages will be included in the forecast only if weather or a condition of operational significance is forecast. It will be indicated by writing FROPA preceded by a four figure time group indicating the expected time of frontal passage and will be followed by an adjusted forecast.

R)

```
Example:  PLATF 1212 15OVC 1RW 2315G20 QNH 29.98
                     1300Z CLD FROPA 20BKN 80BKN 7 3215G30 QNH 30.01
```

Ceiling and visibility are forecast to be 1500 feet overcast and 1 mile in rain showers. A cold front is expected to pass the station at 13Z with conditions improving to 2000 feet broken 8000 feet broken and visibility 7 miles after frontal passage.

(6) Complete PLATF with explanation.

R)

```
PLATF 0909 15SCT 80BKN 15 1810 SCT V BKN QNH 30.02
           12Z 15BKN 80OVC 5H 1810 10OVC 2TRW VCNTY QNH 30.00
           15Z 15OVC 3R-F 1815 OCNL 80OVC 1RF QNH 29.99
           17Z 5OVC 3/4RF 1810 VSBY 1/2V1 QNH 29.98
           19Z 25OVC 5R-F 2315 TEMP 15OVC 3RF QNH 29.98
GRADU 21Z-23Z 15OVC 1TRW 2315G25 QNH 29.97
           00Z   CLD FROPA 20SCT 80BKN 10 3215G30 QNH 30.01
           03Z CLR 10 3312G25 QNH 30.04
```

The Plain Language Terminal Forecast covers a 24 hour period from 0900Z to 0900Z. The forecast for 0900Z to 1200Z is for 1500 feet scattered 8000 feet broken, visibility 15 miles.

Surface wind is forecast to be from 180° at 10 knots. The 1500 feet scattered layer will be variable to broken. The lowest forecast altimeter setting is 30.02 inches.

From 1200Z to 1500Z the ceiling is forecast to be 1500 feet broken with a 8000 feet overcast layer above. Visibility is expected to be 5 miles in haze. Expected winds are 180° at 10 knots. REMARKS indicate that widely scattered thunderstorms, with 1000 feet overcast ceilings and visibility of 2 miles in rain showers are expected in the general vicinity and there is only a slight chance that they will affect the station itself. Lowest forecast altimeter setting is 30.00 inches.

Forecast for 1500Z to 1700Z is 1500 overcast with visibility 3 miles in light rain and fog. Occasionally during this period ceilings are expected to lower to 800 feet overcast and visibility reduce to 1 mile in moderate rain and fog. Lowest forecast altimeter setting is 29.99 inches.

1700Z to 1900Z the ceiling is expected to be 500 feet overcast and visibility 3/4 mile in moderate rain and fog. During this period, however, the visibility is expected to be variable between 1/2 and 1 mile. Wind is forecast to be 180° at 10 knots. Lowest forecast altimeter setting is 29.98 inches.

1900Z to 2100Z the forecast ceiling and visibility are 2500 feet overcast and 5 miles in light rain and fog. For temporary periods during this time, the ceiling is expected to lower to 1500 feet overcast and visibility reduce to 3 miles in moderate rain and fog. Winds of 230° at 15 knots are expected. Lowest forecast altimeter setting is 29.98 inches.

From 2100Z to 2300Z the ceiling and visibility are expected to gradually become 1500 feet overcast and 1 mile in thundershowers. Winds are expected to become 230° at 15 knots with gusts to 25 knots. Lowest forecast altimeter setting is 29.97 inches.

At 0000Z a cold front is expected to pass the area with conditions improving to 2000 feet scattered 8000 feet broken and visibility 10 miles after frontal passage. Winds will veer to 320° at 15 knots with gusts to 30 knots. Lowest forecast altimeter setting is 30.01 inches.

From 0300Z to the end of the forecast period at 0900Z, conditions are expected to be clear with 10 miles visibility and surface winds 330° at 12 knots with gusts to 25 knots. Lowest forecast altimeter setting is 30.04 inches.

h. Amended Terminal Forecast. An amended terminal forecast will be issued at anytime the forecaster considers it advisable in the interest of safety, efficiency of aircraft operations, flight planning, dispatching, operational control and in-flight assistance to aircraft. In determining the need for an amendment, first consideration will be given to providing adequate advance warning of development of conditions bearing on safety of enroute aircraft and the adjustment of any forecast that is failing in such a way as to create a potential hazard. The following criteria should be used as additional guidelines in determining whether an amendment is needed. However, both the responsibility and the authority for issuing amendments, when they are of importance in the sense outlined above, rest upon the forecaster.

(1) Thunderstorms

(a) A thunderstorm was not forecast, but later occurs or is expected to occur.

(b) A thunderstorm was forecast, but later is not expected to occur.

(2) Surface Wind

(a) The surface wind was forecast less than 15 knots, but later is expected to reach or is reported as 25 knots or more..

(b) The surface wind was forecast as 25 knots or more, but later is expected to be in error by 20 knots or more.

(3) Icing

(a) Freezing precipitation at the surface or ice pellets was not forecast, but later occurs or is expected to occur.

(b) Freezing precipitation at the surface or ice pellets was forecast, but later none is expected.

(4) Ceiling

Forecast Value	Amend forecast if conditions change to or are later expected to become
2000' or above	1000' or below
1000' or above	500' or below
below 1000'	2000' or above
below 500'	1000' or above

(5) Visibility

Forecast Value	Amend forecast if conditions change to or are later expected to become
5 miles or more	3 miles or less
2 miles or more	1 mile or less
less than 3 miles	5 miles or more
less than 1 mile	2 miles or more

These criteria will be prominently posted for ready reference of forecasters.

(6) Amended terminal forecast will be written in the same form as the scheduled terminal forecast except that the contraction "AMD" will follow the valid time of the forecast. Amended forecast will extend only to the end of the current (original) forecast period. Delayed or corrected forecast will be filed in the same manner except the contraction "RTD" or "COR" will follow the valid time.

i. PLATF Format (Heading Example).

(1) Scheduled

PLATF 0303 Text

(2) Amended

PLATF 0503 AMD Text

(3) Correction

PLATF 0303 COR Text

(4) Delayed

PLATF 0303 RTD Text

NOTES: 1. Station call letters will be inserted automatically by equipment.

2. 0303, 0503, etc.; shows valid period of forecast.

APPENDIX D

PROGRAMMED TEXT PRODUCED USING AUTHOR ROUTINES, INCLUDING ON-LINE AND OFF-LINE EDITING

The capabilities of the AUTHOR routines were fully exercised in writing Basic Exercises in Morse Code which is contained in this appendix. Two separate AUTHOR runs were made--one to create a text to teach receiving Morse code and the other to teach sending Morse code. Using on-line editing routines, these texts were merged and the directions were adapted to exercises in both receiving and sending code. The graphic memory aids were added manually.

After the draft package was developed, modifications were made based on tryout performance using eight students in the Signal School. On-line editing routines were used in making these changes. The final manuscript was produced on a typewriter and the final art added manually. The material which follows is presented exactly as it would appear as output from a phototypesetter.

BASIC EXERCISES IN MORSE CODE

A TRAINING PROGRAM FOR SIGNALMEN

Richard Braby and James Ainsworth

(Illustrations by Archie Poole)

November 1977

Training Analysis and Evaluation Group, Orlando, Florida 32813

Go to 02

Learning Objective

After completing this program, you will be able to write the Morse Code equivalents of LETTERS, NUMBERS, and PUNCTUATION MARKS.

Example: Given A Write .-

You will also be able to write the meaning of printed Morse Code symbols.

Example: Given .- Write A

You will be able to do this without error or hesitation.

Go to 3

IMPORTANCE OF THIS PROGRAM TO YOU 3

Importance of Symbols	Sending and receiving messages in Morse Code are major parts of a signalman's job. You must be able to perform these tasks accurately and rapidly.
How Skill Will be Used	This program will help you learn the meanings or definitions of Morse Code symbols presented on paper. This is the first step in learning to send and receive messages by flashing light.

Go to 4

ORGANIZATION OF THE LEARNING PROGRAM

Overview

The 42 symbols in this program have been divided into 6 practice sets. You will learn each set separately. Then you will practice all 42 symbols in several exercises.

Page numbers are located at the top, right corner of each page. Directions on how to proceed through program are located at the bottom, right corner.

FOR BEST RESULTS, FOLLOW ALL DIRECTIONS.

Go to 5

The symbols in this set are:

.   ..   .   -   --

You will learn to recognize and define these symbols in the next few pages.

Go to 6

Directions

1. Look carefully at each DEFINITION, MEMORY AID, and SYMBOL on the next page. Each Memory Aid includes a phonetic alphabet word and a picture with the corresponding Morse Code symbol buried inside.

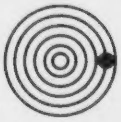
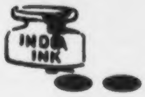
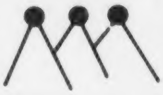
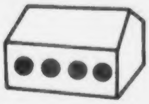
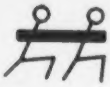
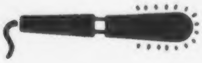
2. Find the Morse Code symbol in each picture. Remember how the dots and dashes appear in each picture. Study each definition, memory aid, and symbol 4 or 5 times.

3. Cover up all Memory Aids and Symbols. Recall the memory aid and code for each letter.

4. Cover up all Definitions and Memory Aids. Recall the memory aid and letter for each code.

Go to 7

SYMBOL SET #1: LEARN SYMBOL DEFINITIONS

Definition	Memory Aid	Symbol
E	ECHO on sonar 	.
I	2 INDIA ink spots 	..
S	3 SIERRA mountains 	...
H	4 HOTEL windows 	....
T	TANGO dancers 	-
M	MIKE 	--

Go to 8

Directions

1. Read all directions before you practice.
2. On page 9, recall the Memory Aid for each letter in the "Practice Symbols" section. Then recall the Morse Code for that letter. WRITE the code on scratch paper.
3. CHECK your answers after writing them down. The answers are below the practice symbols.

Go to 9

SYMBOL SET #1: PRACTICE DEFINING THE SYMBOLS

9

Practice	I	E	M	T	S	H	T	I	S
Symbols	H	M	E	S	I	E	H	T	M
	M	S	E	M	T	I	S	H	E
	I	S	T	M	E	H	T	E	S
	H	M	I	S	S	M	H	T	I

Answers

T	-
M	--
I	..
E	.
S	...
H	....

Go to 10

Directions

1. Read all directions before you practice.
2. On page 11, recall the Memory Aid for each Morse Code symbol in the "Practice Symbols" section. Then recall the letter associated with that code. WRITE the letter on scratch paper.
3. CHECK your answers after writing them down. The answers are below the practice symbols.

Go to 11

SYMBOL SET #1: PRACTICE DEFINING THE SYMBOLS

Practice	...	.	....	..	--	-	....	
Symbols	-	.	....	..	--	...	....	
	.	...	-	..	--	....	--	
	--	-	....	..	.	...	...	
	--	..	...	-	.	....	-	.

Answers

..	I
--	M
-	T
.	E
...	S
....	H

Go to 12

SYMBOL SET #1: PRACTICE DEFINING THE SYMBOLS

Directions	1. You need more practice with the symbols on pages 9 and 11.
	2. This time, only THINK your answers. Don't take time to write them.
	3. CHECK an answer ONLY when you think it may be wrong.
	4. Vary the way you go through the practice symbols. (Left to right, then right to left.)
	5. Keep practicing until you recall the answers without hesitating.

To practice...	Go back to 9 and 11
After practicing...	Go to 13

SYMBOL SET #1: TEST YOURSELF

Directions

1. You are now ready to test yourself over the Morse Code symbols in this set. The "Self Test" is below.
2. For Part A, write the Morse Code for each letter. For Part B, write the letter associated with each code. Use scratch paper.

Self Test

A		B	
1.	H	1.	-
2.	T	2.	...
3.	M	3.	.
4.	E	4.	..
5.	I	5.	....
6.	S	6.	--

For answers... Go to 14

SYMBOL SET #1: TEST YOURSELF

Symbols	Answers	Symbols	Answers
A 1. H	....	B 1. -	T
2. T	-	2. ...	S
3. M	--	3. .	E
4. E	.	4. ..	I
5. I	..	5.	H
6. S	...	6. --	M

Go to 15

End of Test

1. If you missed any, you need more practice:

   - skip symbols you already know
   - spend extra time on those symbols you find difficult to remember
   - do the self test after you practice each time

   To Practice... Go back to 9 and 11

2. If you recalled all symbols in this set, CONGRATULATIONS!

   For next set of symbols... Go to 16

SYMBOL SET #2

The symbols in this set are:

.-   ..-   ...-   -.   -..

-...   .---

You will learn to recognize and define these symbols in the next few pages.

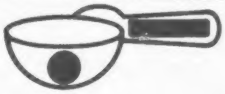
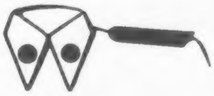
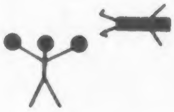
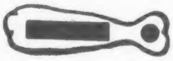
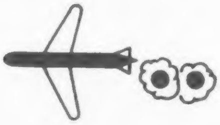
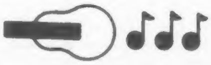
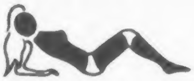
Go to 17

Directions

1. Look carefully at each DEFINITION, MEMORY AID, and SYMBOL on the next page. Each Memory Aid includes a phonetic alphabet word and a picture with the corresponding Morse Code symbol buried inside.
2. Find the Morse Code symbol in each picture. Remember how the dots and dashes appear in each picture. Study each definition, memory aid, and symbol 4 or 5 times.
3. Cover up all Memory Aids and Symbols. Recall the memory aid and code for each letter.
4. Cover up all Definitions and Memory Aids. Recall the memory aid and letter for each code.

Go to 18

SYMBOL SET #2: LEARN SYMBOL DEFINITIONS

Definition	Memory Aid	Symbol
A	ALFA - alphabet soup 	.-
U	UNIFORM insignia 	..-
V	VICTOR in boxing 	...-
N	NOVEMBER turkey 	-.
D	DELTA jet and 2 clouds 	-..
B	BRAVO! Play 3 notes again! 	-...
J	JULIETT 	.---

Go to 19

Directions

1. Read all directions before you practice.
2. On page 20, recall the Memory Aid for each letter in the "Practice Symbols" section. Then recall the Morse Code for that letter. WRITE the code on scratch paper.
3. CHECK your answers after writing them down. The answers are below the practice symbols.

Go to 20

SYMBOL SET #2: PRACTICE DEFINING THE SYMBOLS

Practice Symbols	A	N	D	J	V	U	B	N	D
	D	A	U	V	B	J	D	U	A
	A	B	N	V	J	J	A	V	U
	N	D	U	B	V	N	A	D	U
	U	B	J	J	A	N	V	D	U

Answers

N	-.
D	-..
V	...-
U	..-
A	.-
B	-...
J	.---

Go to 21

SYMBOL SET #2: PRACTICE DEFINING THE SYMBOLS

Directions

1. Read all directions before you practice.
2. On page 22, recall the Memory Aid for each Morse Code symbol in the "Practice Symbols" section. Then recall the letter associated with that code. WRITE the letter on scratch paper.
3. CHECK your answers after writing them down. The answers are below the practice symbols.

Go to 22

SYMBOL SET #2: PRACTICE DEFINING THE SYMBOLS

Practice	-.	..-	.-	-...	.---	...-
Symbols	...-	-..	..-	.-	-.	...-
	-...	.---	...-	-..	-...	-.
	-..	.---	...-	-.	.-	..-
	..-	-...	...-	-.	..-	.---

Answers

.---	J
...-	V
-..	D
-.	N
.-	A
..-	U
-...	B

Go to 23

SYMBOL SET #2: PRACTICE DEFINING THE SYMBOLS

Directions

1. You need more practice with the symbols on pages 20 and 22.
2. This time, only THINK your answers. Don't take time to write them.
3. CHECK an answer ONLY when you think it may be wrong.
4. Vary the way you go through the practice symbols. (Left to right, then right to left.)
5. Keep practicing until you recall the answers without hesitating.

To practice... Go back to 20 and 22
After practicing... Go to 24

SYMBOL SET #2: TEST YOURSELF

Directions

1. You are now ready to test yourself over the Morse Code symbols in this set. The "Self Test" is below.

2. For Part A, write the Morse Code for each letter. For Part B, write the letter associated with each code. Use scratch paper.

Self Test

A		B	
1.	B	1.	.-
2.	A	2.	-.
3.	J	3.	-..
4.	D	4.	..-
5.	U	5.	...-
6.	V	6.	-...
7.	N	7.	.---

For answers... Go to 25

SYMBOL SET #2: TEST YOURSELF

	Symbols	Answers
A 1.	B	-...
2.	A	.-
3.	J	.---
4.	D	-..
5.	U	..-
6.	V	...-
7.	N	-.

	Symbols	Answers
B 1.	.-	A
2.	-.	N
3.	-..	D
4.	..-	U
5.	...-	V
6.	-...	B
7.	.---	J

Go to 26

End of Test

1. If you missed any, you need more practice:

-skip symbols you already know

-spend extra time on those symbols you find difficult to remember

-do the self test after you practice each time

To Practice... Go back to 20 and 22

2. If you recalled all symbols in this set, CONGRATULATIONS!

For next set of symbols... Go to 27

SYMBOL SET #3:

The symbols in this set are:

.--.   -..-   ---   --..   --.-

-.--

You will learn to recognize and define these symbols in the next few pages.

Go to 28

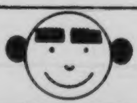
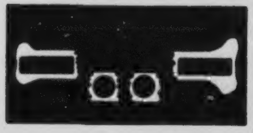
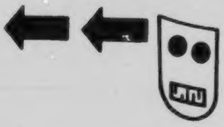
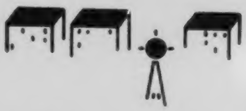
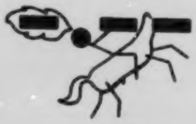
SYMBOL SET #3: LEARN SYMBOL DEFINITIONS

Directions

1. Look carefully at each DEFINITION, MEMORY AID, and SYMBOL on the next page. Each Memory Aid includes a phonetic alphabet word and a picture with the corresponding Morse Code symbol buried inside.
2. Find the Morse Code symbol in each picture. Remember how the dots and dashes appear in each picture. Study each definition, memory aid, and symbol 4 or 5 times.
3. Cover up all Memory Aids and Symbols. Recall the memory aid and code for each letter.
4. Cover up all Definitions and Memory Aids. Recall the memory aid and letter for each code.

Go to 29

SYMBOL SET #3: LEARN SYMBOL DEFINITIONS

Definition	Memory Aid	Symbol
P	PAPA's ears and eyebrows 	.--.
X	XRAY of broken bone 	-..-
O	3 OSCAR Meyer weiners	---
Z	ZULU warrior throwing spears 	--..
Q	QUEBEC city 	--.-
Y	YANKEE Doodle 	-.--

Go to 30

SYMBOL SET #3: PRACTICE DEFINING THE SYMBOLS

Directions

1. Read all directions before you practice.
2. On page 31, recall the Memory Aid for each letter in the "Practice Symbols" section. Then recall the Morse Code for that letter. WRITE the code on scratch paper.
3. CHECK your answers after writing them down. The answers are below the practice symbols.

Go to 31

SYMBOL SET #3: PRACTICE DEFINING THE SYMBOLS

Practice	P	O	Ƶ	X	Y	Q	X	P	O
Symbols	O	Y	Ƶ	Q	Y	X	Q	P	O
	O	Ƶ	X	Y	O	P	Ƶ	Q	X
	X	P	Q	Y	O	Ƶ	P	Q	X
	Ƶ	X	Y	O	Ƶ	P	Y	X	O

Answers

P	.--.
X	-..-
Y	-.--
O	---
Ƶ	--..
Q	--.-

Go to 32

Directions

1. Read all directions before you practice.
2. On page 33, recall the Memory Aid for each Morse Code symbol in the "Practice Symbols" section. Then recall the letter associated with that code. WRITE the letter on scratch paper.
3. CHECK your answers after writing them down. The answers are below the practice symbols.

Go to 33

SYMBOL SET #3: PRACTICE DEFINING THE SYMBOLS

33

Practice	--.-	-..-	--..	---	-.--
Symbols	.--.	.--.	--.-	-..-	---
	-.--	--..	-.--	--..	-..-
	---	.--.	--.-	-.--	---
	.--.	-..-	--..	--.-	--..

Answers	
-..-	X
---	O
-.--	Y
.--.	P
--..	Z
--.-	Q

Go to 34

SYMBOL SET #3: PRACTICE DEFINING THE SYMBOLS

Directions

1. You need more practice with the symbols on pages 31 and 33.
2. This time, only THINK your answers. Don't take time to write them.
3. CHECK an answer ONLY when you think it may be wrong.
4. Vary the way you go through the practice symbols. (Left to right, then right to left.)
5. Keep practicing until you recall the answers without hestitating.

To practice... Go back to 31 and 33

After practicing... Go to 35

SYMBOL SET #3: TEST YOURSELF

Directions

1. You are now ready to test yourself over the Morse Code symbols in this set. The "Self Test" is below.

2. For Part A, write the Morse Code for each letter. For Part B, write the letter associated with each code. Use scratch paper.

Self Test

A	1.	Z	B	1.	---
	2.	P		2.	.--.
	3.	Y		3.	--.-
	4.	X		4.	-..-
	5.	O		5.	--..
	6.	Q		6.	-.--

For answers... Go to 36

SYMBOL SET #3: TEST YOURSELF

	Symbols	Answers
A	1. Z	--..
	2. P	.--.
	3. Y	-.--
	4. X	-..-
	5. O	---
	6. Q	--.-

	Symbols	Answers
B	1. ---	O
	2. .--.	P
	3. --.-	Q
	4. -..-	X
	5. --..	Z
	6. -.--	Y

Go to 37

End of Test

1. If you missed any, you need more practice:

   - -skip symbols you already know
   - -spend extra time on those symbols you find difficult to remember
   - -do the self test after you practice each time

To Practice... Go back to 31 and 33

2. If you recalled all symbols in this set, CONGRATULATIONS!

For next set of symbols... Go to 38

SYMBOL SET #4:

The symbols in this set are:

-.-.   ..-.   .-..   --.   .--

-.-   .-.

You will learn to recognize and define these symbols in the next few pages.

Go to 39

SYMBOL SET #4: LEARN SYMBOL DEFINITIONS

Directions

1. Look carefully at each DEFINITION, MEMORY AID, and SYMBOL on the next page. Each Memory Aid includes a phonetic alphabet word and a picture with the corresponding Morse Code symbol buried inside.

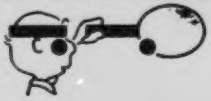
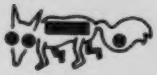
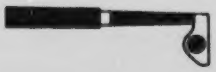
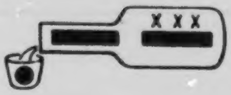
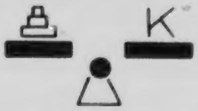
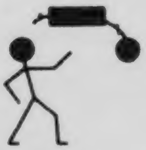
2. Find the Morse Code symbol in each picture. Remember how the dots and dashes appear in each picture. Study each definition, memory aid, and symbol 4 or 5 times.

3. Cover up all Memory Aids and Symbols. Recall the memory aid and code for each letter.

4. Cover up all Definitions and Memory Aids. Recall the memory aid and letter for each code.

Go to 40

SYMBOL SET #4: LEARN SYMBOL DEFINITIONS

Definition	Memory Aid	Symbol
C	CHARLIE Brown 	-.-.
F	FOX TROTting 	..-.
L	LIMA beans	.-..
G	GOLF club 	--.
W	WHISKEY 	.--
K	KILOgram 	-.-
R	ROMEO throwing rose 	.-.

Go to 41

Directions

1. Read all directions before you practice.
2. On page 42, recall the Memory Aid for each letter in the "Practice Symbols" section. Then recall the Morse Code for that letter. WRITE the code on scratch paper.
3. CHECK your answers after writing them down. The answers are below the practice symbols.

Go to 42

SYMBOL SET #4: PRACTICE DEFINING THE SYMBOLS

Practice	L	G	K	F	C	R	W	C	R
Symbols	G	F	L	R	W	K	R	F	K
	G	K	C	L	W	R	K	G	C
	W	C	F	L	L	R	G	F	C
	C	W	K	F	R	L	G	C	W

Answers

C	-.-.
R	.-.
G	--.
F	..-.
L	.-..
W	.--
K	-.-

Go to 43

SYMBOL SET #4: PRACTICE DEFINING THE SYMBOLS

Directions

1. Read all directions before you practice.
2. On page 44, recall the Memory Aid for each Morse Code symbol in the "Practice Symbols" section. Then recall the letter associated with that code. WRITE the letter on scratch paper.
3. CHECK your answers after writing them down. The answers are below the practice symbols.

Go to 44

SYMBOL SET #4; PRACTICE DEFINING THE SYMBOLS

Practice	..-.	-.-.	--.	-.-	.-.	.--
Symbols	.--	.-..	..-.	-.-	--.	.--
	-.-.	.-.	.--	.-..	..-.	-.-
	-.-	--.	.--	-.-.	.-.	.-..
	.-..	.--	--.	.-..	-.-.	.-.

Answers	
--.	G
-.-.	C
.-.	R
.--	W
..-.	F
.-..	L
-.-	K

Go to 45

SYMBOL SET #4: PRACTICE DEFINING THE SYMBOLS

Directions

1. You need more practice with the symbols on pages 42 and 44.

2. This time, only THINK your answers. Don't take time to write them.

3. CHECK an answer ONLY when you think it may be wrong.

4. Vary the way you go through the practice symbols. (Left to right, then right to left.)

5. Keep practicing until you recall the answers without hestitating.

To practice... Go back to 42 and 44

After practicing... Go to 46

SYMBOL SET #4: TEST YOURSELF

46

Directions

1. You are now ready to test yourself over the Morse Code symbols in this set. The "Self Test" is below.

2. For Part A, write the Morse Code for each letter. For Part B, write the letter associated with each code. Use scratch paper.

Self Test

	A		B
1.	F	1.	..-.
2.	G	2.	-.-.
3.	W	3.	-.-
4.	C	4.	.-..
5.	L	5.	--.
6.	K	6.	.--
7.	R	7.	.-.

For answers... Go to 47

SYMBOL SET #4: TEST YOURSELF

		Symbols	Answers
A	1.	F	..-.
	2.	G	--.
	3.	W	.--
	4.	C	-.-.
	5.	L	.-..
	6.	K	-.-
	7.	R	.-.

		Symbols	Answers
B	1.	..-.	F
	2.	-.-.	C
	3.	-.-	K
	4.	.-..	L
	5.	--.	G
	6.	.--	W
	7.	.-.	R

Go to 48

End of Test

1. If you missed any, you need more practice:

   - skip symbols you already know
   - spend extra time on those symbols you find difficult to remember
   - do the self test after you practice each time

   To Practice... Go back to 42 and 44

2. If you recalled all symbols in this set, CONGRATULATIONS!

For next set of symbols... Go to 49

SYMBOL SET #5:

The symbols in this set are:

```
.----     ..---     ...--     ....-
.....     -....     --...     ---..
----.     -----
```

You will learn to recognize and define these symbols in the next few pages.

Go to 50

SYMBOL SET #5: LEARN SYMBOL DEFINITIONS

Directions

1. Look carefully at each DEFINITION, MEMORY AID, and SYMBOL on the next page. Each Memory Aid indicates how the Morse Code symbol for that number was obtained. Notice that the Symbol for every number contains 5 dots or dashes.
2. Study each definition, memory aid, and symbol 4 or 5 times.
3. Cover up all Memory Aids and Symbols. Recall the memory aid and code for each number.
4. Cover up all Definitions and Memory Aids. Recall the memory aid and number for each code.

Go to 51

SYMBOL SET #5: LEARN SYMBOL DEFINITIONS

Definition	Memory Aid	Symbol
1	1 dot	.----
2	2 dots	..---
3	3 dots	...--
4	4 dots	....-
5	5 dots	.....
6	1 dash (+5)	-....
7	2 dashes (+5)	--...
8	3 dashes (+5)	---..
9	4 dashes (+5)	----.
0	5 dashes	-----

Go to 52

SYMBOL SET #5: PRACTICE DEFINING THE SYMBOLS

Directions

1. Read all directions before you practice.
2. On pages 53 and 54, recall the Memory Aid for each number in the "Practice Symbols" section. Then recall the Morse Code for that number. WRITE the code on scratch paper.
3. CHECK your answers after writing them down. The answers are below the practice symbols.

Go to 53

SYMBOL SET #5: PRACTICE DEFINING THE SYMBOLS

Practice	1	4	9	3	0	5	2	4	1
Symbols	3	1	0	5	2	9	0	4	5
	1	2	3	5	9	5	4	2	1
	9	0	3	1	5	9	0	2	3
	3	4	1	2	0	1	4	3	5

Answers

0	-----
3	...--
4	....-
5	.....
2	..---
9	----.
1	.----

To continue exercise... Go to 54

SYMBOL SET #5: PRACTICE DEFINING THE SYMBOLS

Practice	7	0	6	1	8	2	9	8	0
Symbols	7	2	0	6	9	1	8	1	7
	9	2	6	7	0	8	9	1	6
	6	7	0	2	2	8	6	7	0
	0	9	1	2	9	8	6	7	0

Answers

6	-....
7	--...
8	---..
0	-----
2	..---
9	----.
1	.----

Go to 55

SYMBOL SET #5: PRACTICE DEFINING THE SYMBOLS

Directions

1. Read all directions before you practice.
2. On pages 56 and 57, recall the Memory Aid for each Morse Code symbol in the "Practice Symbols" section. Then recall the number associated with that code. WRITE the number on scratch paper.
3. CHECK your answers after writing them down. The answers are below the practice symbols.

Go to 56

SYMBOL SET #5: PRACTICE DEFINING THE SYMBOLS

56

Practice Symbols	--...	.----	...--	....-
	-----	.....	..---	.----
	....-	-----	--...	...--
	.....	..---	.....	..---
	...--	--...	-----	....-

Answers

-----	0
--...	7
...--	3
....-	4
.....	5
..---	2
.----	1

To continue exercise... Go to 57

SYMBOL SET #5: PRACTICE DEFINING THE SYMBOLS

Practice Symbols	---..	.....	-....	.----
	----.	..---	...--	----.
	.----	...--	---..	-....
	..---	.....	---..	...--
	..---	.----	-....	----.

Answers

-....	6
---..	8
----.	9
.----	1
..---	2
...--	3
.....	5

Go to 58

Directions

1. You need more practice with the symbols on pages 53, 54, 56, and 57.
2. This time, only THINK your answers. Don't take time to write them.
3. CHECK an answer ONLY when you think it may be wrong.
4. Vary the way you go through the practice symbols. (Left to right, then right to left.)
5. Keep practicing until you recall the answers without hesitating.

To practice...Go back to 53, 54, 56, and 57
After practicing... Go to 59

SYMBOL SET #5: TEST YOURSELF

Directions

1. You are now ready to test yourself over the Morse Code symbols in this set. The "Self Test" is below.

2. For Part A, write the Morse Code for each number. For Part B, write the number associated with each code. Use scratch paper.

Self Test

A

1. 2
2. 1
3. 7
4. 4
5. 3
6. 0
7. 5
8. 6
9. 8
10. 9

B

1. ..---
2. ....-
3. ...--
4. ---..
5. --...
6. -....
7. .----
8. .....
9. ----.
10. -----

For answers... Go to 60

SYMBOL SET #5: TEST YOURSELF

	Symbols	Answers
A 1.	2	..---
2.	1	.----
3.	7	--...
4.	4	....-
5.	3	...--
6.	0	-----
7.	5	.....
8.	6	-....
9.	8	---..
10.	9	----.

	Symbols	Answers
B 1.	..---	2
2.	....-	4
3.	...--	3
4.	---..	8
5.	--...	7
6.	-....	6
7.	.----	1
8.	.....	5
9.	----.	9
10.	-----	0

Go to 61

End of Test

1. If you missed any, you need more practice:

- skip symbols you already know
- spend extra time on those symbols you find difficult to remember
- do the self test after you practice each time

To Practice... Go back to 53, 54, 56, and 57

2. If you recalled all symbols in this set, CONGRATULATIONS!

For next set of symbols... Go to 62

SYMBOL SET #6:

62

The symbols in this set are:

`--..--`   `-....-`   `-.--.`   `-.--.-`

`.-.-.-`   `-..-.`

You will learn to recognize and define these symbols in the next few pages.

Go to 63

SYMBOL SET #6: LEARN SYMBOL DEFINITIONS

Directions

1. Look carefully at each DEFINITION, MEMORY AID, and SYMBOL on the next page. Each Memory Aid consists of letters representing parts of the entire code. For example, the Memory Aid for comma is MIM because M(--) I(..) M(--) yields the code for comma, (--..--).
2. Study each definition, memory aid, and symbol 4 or 5 times.
3. Cover up all Memory Aids and Symbols. Recall the memory aid and code for each punctuation mark.
4. Cover up all Definitions and Memory Aids. Recall the memory aid and punctuation mark for each code.

Go to 64

SYMBOL SET #6: LEARN SYMBOL DEFINITIONS

Definition	Memory Aid	Symbol
,	MIM Note: M I M -- .. --	--..--
-	DU Note: D U -.. ..-	-....-
(	KN Note: K N -.- -.	-.--.
)	KK Note: K K -.- -.-	-.--.-
.	AAA Note: A A A .- .- .-	.-.-.-
/	XE Note: X E -..- .	-..-.

Go to 65

SYMBOL SET #6: PRACTICE DEFINING THE SYMBOLS

Directions

1. Read all directions before you practice.
2. On page 66, recall the Memory Aid for each punctuation mark in the "Practice Symbols" section. Then recall the Morse Code for that mark. WRITE the code on scratch paper.
3. CHECK your answers after writing them down. The answers are below the practice symbols.

Go to 66

SYMBOL SET #6: PRACTICE DEFINING THE SYMBOLS

Practice	/	-	)	(	,	.	(	/	.
Symbols	-	)	,	.	(	)	,	-	.
	.	/	,	)	.	(	-	/	/
	)	/	(	-	,	.	,	-	)
	(	)	.	/	)	.	,	(	-

Answers

)	KK = -.- -.-
(	KN = -.- -.
-	DU = -.. ..-
,	MIM = -- .. --
.	AAA = .- .- .-
/	XE = -..- .

Go to 67

SYMBOL SET #6: PRACTICE DEFINING THE SYMBOLS

Directions

1. Read all directions before you practice.
2. On page 68, recall the Memory Aid for each Morse Code symbol in the "Practice Symbols" section. Then recall the punctuation mark associated with that code. WRITE the punctuation mark on scratch paper.
3. CHECK your answers after writing them down. The answers are below the practice symbols.

Go to 68

SYMBOL SET #6: PRACTICE DEFINING THE SYMBOLS

Practice	.-.-.-	-.--.	-....-	-.--.-
Symbols	-..-.	--..--	.-.-.-	--..--
	-.--.-	-..-.	-....-	-.--.
	-.--.	-....-	-.--.-	-..-.
	-..-.	--..--	.-.-.-	-..-.

Answers

.-.-.-	.- .- .-	=	AAA	=	.
-.--.-	-.- -.-	=	KK	=	)
-..-.	-..- .	=	XE	=	/
--..--	-- .. --	=	MIM	=	,
-....-	-.. ..-	=	DU	=	-
-.--.	-.- -.	=	KN	=	(

Go to 69

SYMBOL SET #6: PRACTICE DEFINING THE SYMBOLS

Directions

1. You need more practice with the symbols on pages 66 and 68.

2. This time, only THINK your answers. Don't take time to write them.

3. CHECK an answer ONLY when you think it may be wrong.

4. Vary the way you go through the practice symbols. (Left to right, then right to left.)

5. Keep practicing until you recall the answers without hesitating.

To practice...	Go back to 66 and 68
After practicing...	Go to 70

SYMBOL SET #6: TEST YOURSELF

Directions

1. You are now ready to test yourself over the Morse Code symbols in this set. The "Self Test" is below.
2. For Part A, write the Morse Code for each punctuation mark. For Part B, write the punctuation mark associated with each code. Use scratch paper.

Self Test

	A		B
1.	-	1.	-.--.-
2.	.	2.	-..-.
3.	/	3.	--..--
4.	,	4.	-....-
5.	(	5.	-.--.
6.	)	6.	.-.-.-

For answers... Go to 71

SYMBOL SET #6: TEST YOURSELF

Symbols	Answers	Symbols	Answers
A 1. -	-....-	B 1. -.--.-	)
2. .	.-.-.-	2. -..-.	/
3. /	-..-.	3. --..--	,
4. ,	--..--	4. -....-	-
5. (	-.--.	5. -.--.	(
6.)	-.--.-	6. .-.-.-	.

Go to 72

SYMBOL SET #6: TEST YOURSELF

72

End of Test

1. If you missed any, you need more practice:

- skip symbols you already know
- spend extra time on those symbols you find difficult to remember
- do the self test after you practice.

To practice... Go back to 66 and 68

2. If you [illegible]alled all symbols in this set, CONGRATULATIONS!

Go to 73

PRACTICE DEFINING ALL SYMBOLS

Overview	Now you will practice recalling all 42 symbols in several exercises.
Directions	Read all the directions before starting the first exercise.

1. RECALL the definition of each symbol in the exercises on the following pages.

2. WRITE the symbol's definition on scratch paper.

3. CHECK your answers ONLY if you are in doubt.

Go to 74

PRACTICE DEFINING ALL SYMBOLS

74

Practice	T	I	4	,	)	K	J	B	F
Symbols	F	G	2	3	V	V	I	J	2
	,	K	B	2	F	4	T	)	G
	G	3	)	3	,	F	I	4	T
	T	J	K	B	G	2	V	J	B
	I	F	,	3	K	G	V	4	T
	T	B	)	2	G	J	I	V	)
	F	K	,	2	4	T	B	)	3
	3	,	I	3	F	V	T	B	J
	)	K	4	J	G	2	F	3	K
	,	2	K	J	)	I	4	T	B
	B	G	V	,	J	G	)	2	F
	B	V	3	K	4	T	F	I	,
	3	2	4	G	,	F	T	K	J

To check answers... Go to 75

PRACTICE DEFINING ALL SYMBOLS - ANSWERS

Symbols	ANSWERS
)	-.--.-
,	--..--
2	..---
3	...--
4	....-
B	-...
F	..-.
G	--.
I	..
J	.---
K	-.-
T	-
V	...-

To continue... Go to 76

PRACTICE DEFINING ALL SYMBOLS

Practice	7	P	S	W	L	0	5	U	A
Symbols	A	.	Y	Ƶ	1	L	A	Ƶ	W
	0	.	Y	7	5	U	P	W	S
	S	1	W	1	.	P	S	Ƶ	A
	L	0	A	U	5	Y	7	Ƶ	Y
	Y	S	5	L	7	.	A	U	P
	P	0	W	1	.	0	P	L	W
	Y	1	Ƶ	7	A	U	5	W	S
	S	P	.	Y	W	0	7	L	1
	1	A	U	5	Ƶ	S	U	A	Ƶ
	5	.	1	W	0	7	L	P	Y
	Y	Ƶ	S	W	Ƶ	U	7	L	Y
	A	.	1	P	5	0	Y	S	P
	W	0	5	U	L	A	S	.	P

To check answers... Go to 77

PRACTICE DEFINING ALL SYMBOLS - ANSWERS

Symbols	Answers
.	.-.-.-
1	.----
5	.....
7	--...
A	.-
L	.-..
O	---
P	.--.
S	...
U	..-
W	.--
Y	-.--
Z	--..

To continue... Go to 78

PRACTICE DEFINING ALL SYMBOLS

Practice	N	E	X	M	Q	8	R	D	9
Symbols	9	H	C	6	0	E	C	9	0
	R	D	M	6	0	X	H	N	Q
	Q	8	9	E	H	X	0	R	D
	D	6	M	N	Q	C	8	M	6
	8	X	C	6	D	0	R	9	E
	E	H	N	Q	E	C	N	H	6
	D	0	Q	6	R	X	9	M	8
	8	N	R	Q	M	C	9	E	8
	H	X	D	6	8	0	9	H	C
	C	E	M	X	0	8	R	D	N
	N	Q	6	R	X	9	8	Q	N
	0	6	N	D	E	H	M	C	D
	X	D	0	9	H	R	N	M	E

To check answers.... Go to 79

PRACTICE DEFINING ALL SYMBOLS - ANSWERS

Symbols	Answers
0	-----
6	-....
8	---..
9	----.
C	-.-.
D	-..
E	.
H	....
M	--
N	-.
Q	--.-
R	.-.
X	-..-

To continue... Go to 80

PRACTICE DEFINING ALL SYMBOLS

Practice Symbols	5	D	X	0	-	W	S	/	(
	(	1	Q	.	R	Q	1	.	D
	X	/	-	W	S	(	0	D	5
	5	R	/	X	-	D	5	0	S
	1	Q	(	W	.	S	R	1	Q
	X	Q	-	W	5	D	(	/	0
	0	.	S	R	.	Q	1	(	D
	5	/	R	S	-	W	0	D	X
	X	5	R	X	0	W	Q	1	/
	.	-	(	/	D	S	.	D	Q
	Q	1	/	W	(	5	-	0	S
	S	X	R	D	Q	W	-	1	5
	/	0	R	(	.	S	X	5	S
	Q	-	0	S	D	/	5	(	W

To check answers... Go to 81

PRACTICE DEFINING ALL SYMBOLS - ANSWERS

81

Symbols	Answers
(	-.--.
-	-....-
.	.-.-.-
/	-..-.
0	-----
1	.----
5	.....
D	-..
Q	--.-
R	.-.
S	...
W	.--
X	-..-

Go to 82

PRACTICE DEFINING ALL SYMBOLS

```
Practice     ...-   ..-    .--     ---    -..    -.-.

Symbols      .---   .----  --...   ..---   .....

             .....  -.-.   -.--.   --..    ..-

             -.-.   ..---  --..    -..    ..-

             .....   ---   ...-   --...    .---

             .---   .----  .--     -.--.   .---

             -.--.  ..---   ---    --..    ..-

             --...  .--   .----    -..    .....

             .....   .---    -.-.   ...-   .---

             -.--.   --..    .----    .--    ...-

             --...   .....    ..-    -.-.    -..

             ..---   .---    ---    ...-    ...-

             ..-    --..    --...    .--    -.--.

             -..    .....    ..---    .---   .----
```

To check answers... Go to 83

PRACTICE DEFINING ALL SYMBOLS - ANSWERS

Symbols	Anwsers
---	O
--..	Z
--...	7
-.--.	(
-.-.	C
-..	D
.--	W
.---	J
.----	1
..-	U
..---	2
...-	V
.....	5

To continue... Go to 84

PRACTICE DEFINING ALL SYMBOLS

Practice Symbols

```
.-..    --.    ---..    -...    ...    -
-----    .-.    -    .    -.-    -....-
-....-    --..--    -.    -    .    ...
-...    -.    -.-    -....-    --.    ...
.-.    ---..    .-..    ...    -----
--..--    -.    .-.    .    -    -----
...    -...    -....-    .-..    ---..
---..    -.-    -----    --..--    --.
--.    -----    --..--    -....-    .
---..    -    .-..    .    -.    -...
-.-    ...    --.    .-.    -    ---..
-----    .-.    -.-    .-..    -.    ...
.    ---..    -...    ...    -....-
--..--    --.    -.    --..--    -----
```

To check answers... Go to 85

PRACTICE DEFINING ALL SYMBOLS - ANSWERS

Symbols	Answers
-	T
-----	0
---..	8
--.	G
--..--	,
-.	N
-.-	K
-...	B
-....-	-
.	E
.-.	R
.-..	L
...	S

To continue... Go to 86

PRACTICE DEFINING ALL SYMBOLS

86

Practice ..-.   ----.   -....   .-   ..   --

Symbols -..-   .--.   ....-   -.--   ...--

...--   ....   --   --.-   ..   .-

....-   -....   ...--   -..-   .-

.-   ..-.   --.-   -.--   .--.   --

....   --   ----.   ....-   -..-

.-   -....   --   --.-   .--.   ..-.

-.--   ...--   ..   ..-.

----.   ..   ..-.   --   ....-   .-

....   -.--   ...--   ----.   .--.

.--.   .-   -..-   --.-   -....   ..

--.-   .--.   ----.   -.--   ....-

--   ....   -..-   ....-   ...--

..   .-   ..-.   -....   ..-.   .-

To check answers...   Go to 87

PRACTICE DEFINING ALL SYMBOLS - ANSWERS

87

Symbols	Answers
--	M
----.	9
--.-	Q
-.--	Y
-..-	X
-....	6
.-	A
.--.	P
..	I
..-.	F
...--	3
....	H
....-	4

To continue... Go to 88

PRACTICE DEFINING ALL SYMBOLS

```
Practice    -      ....-    .--.    -.--.-    .----
Symbols     .----  .-.-.-   -.      -..-.     -....
            -....  ..---    ....    ..-       .---
            .---   ....     -..-.   -.        .-.-.-
            -....  ..-      -.--.-  .----     .---
            -      .-.-.-   .--.    ..---     ....-
            ....-  .---     ....    -.        -.--.-
            .----  ..-      .-.-.-  -..-.     ..---
            -....  ....-    -.--.-  .--.      .---
            ..---  .---     -       -..-.     .--.    -.
            ..-    -        ....    -....     .----   -.
            ..---  -.--.-   .-.-.-  ....-     -.
            .---   -.       ..---   .---      ....-   -
            -.     -..-.    -.--.-  -....     .--.
```

To check answers... Go to 89

PRACTICE DEFINING ALL SYMBOLS - ANSWERS 89

Symbols	Answers
-	T
-.	N
-.--.-	)
-..-.	/
-....	6
.---	J
.----	1
.--.	P
.-.-.-	.
..-	U
..---	2
....	H
....-	4

Go to 90

PRACTICE DEFINING ALL SYMBOLS

Directions

1. If you missed any or feel you need more practice...

Go to 91

2. If you correctly defined all symbols...

Go to 92

PRACTICE DEFINING ALL SYMBOLS

Directions

1. Keep practicing until you recall the answers without hesitating.
2. THINK your answers. Don't take time to write them.
3. CHECK an answer ONLY when you think it may be wrong.
4. Vary the way you go through the practice symbols. (Left to right, then right to left.)

To practice...	Go back to 74
After practicing...	Go to 92

CRITERION TEST

92

Ready? You should now be ready to take the criterion test.

Directions

1. The test has 2 parts:
   A. SENDING: Given A Write .-
   B. RECEIVING: Given .- Write A
2. Use scratch paper. Check your answers after completing each part of the test.

For criterion test... Go to 93

CRITERION TEST #1: PART A - SENDING

1. 2
2. (
3. C
4. 8
5. I
6.)
7. P
8. O
9. H
10. M
11. ,
12. X
13. Q
14. 4
15. N
16. A
17. K
18. Z
19. B
20. T
21. E
22. Y
23. G
24. U
25. 3
26. .
27. 1
28. R

To continue... Go to 94

29. /

30. 9

31. S

32. V

33. D

34. J

35. F

36. L

37. W

38. 5

39. 6

40. 7

41. 0

42. -

Go to 95

CRITERION TEST #1: PART A - ANSWERS

Symbols	Answers
1. 2	..---
2. (	-.--.
3. C	-.-.
4. 8	---..
5. I	..
6.)	-.--.-
7. P	.--.
8. O	---
9. H	....
10. M	--
11. ,	--..--
12. X	-..-
13. Q	--.-

To continue... Go to 96

CRITERION TEST #1: PART A - ANSWERS

Symbols	Answers
14. 4	....-
15. N	-.
16. A	.-
17. K	-.-
18. Z	--..
19. B	-...
20. T	-
21. E	.
22. Y	-.--
23. G	--.
24. U	..-
25. 3	...--
26. .	.-.-.-

To continue... Go to 97

CRITERION TEST #1: PART A - ANSWERS

Symbols	Answers
27. 1	.----
28. R	.-.
29. /	-..-.
30. 9	----.
31. S	...
32. V	...-
33. D	-..
34. J	.---
35. F	..-.
36. L	.-..
37. W	.--
38. 5	.....
39. 6	-....

To continue... Go to 98

CRITERION TEST #1: PART A - ANSWERS

Symbols	Answers
40. 7	--...
41. 0	-----
42. -	-....-

Go to 99

CRITERION TEST #1: PART B - RECEIVING

1. ....-
2. -.--
3. -.--.-
4. .-.
5. ---
6. .....
7. -.-.
8. .----
9. -.
10. -..
11. -....-
12. ..-
13. .
14. -----
15. --.-
16. ....
17. .---
18. .-
19. -.--.
20. -..-.
21. --..--
22. -..-
23. --..
24. -...
25. -
26. -....
27. --...
28. .--

To continue... Go to 100

CRITERION TEST #1: PART B - RECEIVING

29. ...-

30. .-..

31. ..

32. ...

33. --

34. .--.

35. ..-.

36. --.

37. -.-

38. ..---

39. ...--

40. ---..

41. ----.

42. .-.-.-

Go to 101

CRITERION TEST #1: PART B - ANSWERS

Symbols	Answers
1. ....-	4
2. -.--	Y
3. -.--.-	)
4. .-.	R
5. ---	O
6.	5
7. -.-.	C
8. .----	1
9. -.	N
10. -..	D
11. -....-	-
12. ..-	U
13. .	E

To continue... Go to 102

CRITERION TEST #1: PART B - ANSWERS

Symbols	Answers
14. -----	0
15. --.-	Q
16.	H
17. .---	J
18. .-	A
19. -.--.	(
20. -..-.	/
21. --..--	,
22. -..-	X
23. --..	Z
24. -...	B
25. -	T
26. -....	6

To continue... Go to 103

CRITERION TEST #1; PART B - ANSWERS

Symbols	Answers
27. --...	7
28. .--	W
29. ...-	V
30. .-..	L
31. ..	I
32. ...	S
33. --	M
34. .--.	P
35. ..-.	F
36. --.	G
37. -.-	K
38. ..---	2
39. ...--	3

To continue... Go to 104

CRITERION TEST #1: PART B - ANSWERS

Symbols	Answers
40. ---..	8
41. ----.	9
42. .-.-.-	.

Go to 105

End of Test

1. If you correctly defined all symbols...

Go to 132

2. If you missed any:

   a. Make a list of the symbols you missed.

   b. Practice defining these symbols.

   c. Start with the symbols you find most difficult to remember.

   d. Keep practicing until you can correctly define them.

   e. Take the next criterion test...

Go to 106

CRITERION TEST #2: PART A - SENDING

1. A
2. W
3. K
4. H
5. G
6. /
7. (
8. 8
9. M
10. O
11. N
12. B
13. V
14. 3
15. 1
16. P
17. J
18. Z
19.)
20. ,
21. -
22. R
23. 4
24. S
25. X
26. 9
27. 0
28. 6

To continue... Go to 107

CRITERION TEST #2: PART A - SENDING

29. Y
30. Q
31. E
32. I
33. T
34. U
35. D
36. C
37. F
38. L
39. 2
40. 5
41. 7
42. .

Go to 108

CRITERION TEST #2: PART A - ANSWERS

Symbols	Answers
1. A	.-
2. W	.--
3. K	-.-
4. H	....
5. G	--.
6. /	-..-.
7. (	-.--.
8. 8	---..
9. M	--
10. O	---
11. N	-.
12. B	-...
13. V	...-

To continue... Go to 109

CRITERION TEST #2: PART A - ANSWERS

Symbols	Answers
14. 3	...--
15. 1	.----
16. P	.--.
17. J	.---
18. Z	--..
19.)	-.--.-
20. ,	--..--
21. -	-....-
22. R	.-.
23. 4	....-
24. S	...
25. X	-..-
26. 9	----.

To continue... Go to 110

CRITERION TEST #2: PART A - ANSWERS

Symbols	Answers
27. 0	-----
28. 6	-....
29. Y	-.--
30. Q	--.-
31. E	.
32. I	..
33. T	-
34. U	..-
35. D	-..
36. C	-.-.
37. F	..-.
38. L	.-..
39. 2	..---

To continue... Go to 111

CRITERION TEST #2: PART A - ANSWERS

Symbols	Answers
40. 5	.....
41. 7	--...
42. .	.-.-.-

Go to 112

CRITERION TEST #2: PART B - RECEIVING

1. .-
2. .--
3. ----.
4. ...
5. ..
6. -.--.-
7. --...
8. ....
9. ....-
10. -.-.
11. .
12. --..--
13. .....
14. .---
15. -.--
16. .----
17. -
18. -.
19. ..-
20. ..---
21. -....-
22. -..
23. -....
24. -----
25. ---
26. --.-
27. .-.
28. --..

To continue... Go to 113

CRITERION TEST #2: PART B - RECEIVING

29. ...-

30. .--.

31. --

32. -...

33. -..-

34. ..-.

35. .-..

36. --.

37. -.-

38. ...--

39. ---..

40. -.--.

41. .-.-.-

42. -..-.

Go to 114

CRITERION TEST #2: PART B - ANSWERS

Symbols	Answers
1. .-	A
2. .--	W
3. ----.	9
4. ...	S
5. ..	I
6. -.--.-	)
7. --...	7
8.	H
9. ....-	4
10. -.-.	C
11. .	E
12. --..--	,
13.	5

To continue... Go to 115

CRITERION TEST #2: PART B - ANSWERS

Symbols	Answers
14. .---	J
15. -.--	Y
16. .----	1
17. -	T
18. -.	N
19. ..-	U
20. ..---	2
21. -....-	-
22. -..	D
23. -....	6
24. -----	0
25. ---	O
26. --.-	Q

To continue... Go to 116

CRITERION TEST #2: PART B - ANSWERS

Symbols	Answers
27. .-.	R
28. --..	Z
29. ...-	V
30. .--.	P
31. --	M
32. -...	B
33. -..-	X
34. ..-.	F
35. .-..	L
36. --.	G
37. -.-	K
38. ...--	3
39. ---..	8

To continue... Go to 117

CRITERION TEST #2: PART B - ANSWERS

Symbols	Answers
40. -.--.	(
41. .-.-.-	.
42. -..-.	/

Go to 118

End of Test

1. If you correctly defined all symbols...

Go to 132

2. If you missed any:

   a. Make a list of the symbols you missed.

   b. Practice defining these symbols.

   c. Start with the symbols you find most difficult to remember.

   d. Keep practicing until you can correctly define them.

   e Take the next criterion test...

Go to 119

CRITERION TEST #3: PART A - SENDING

1. J
2. 6
3. F
4. I
5. /
6. K
7. P
8. 2
9. W
10. N
11. 9
12. 7
13. G
14. C
15. H
16.)
17. Z
18. 1
19. D
20. B
21. 4
22. 3
23. E
24. .
25. M
26. A
27. 5
28. X

To continue... Go to 120

CRITERION TEST #3: PART A - SENDING

120

29. -

30. R

31. S

32. T

33. U

34. V

35. O

36. Q

37. Y

38. L

39. 8

40. 0

41. ,

42. (

Go to 121

CRITERION TEST #3: PART A - ANSWERS

Symbols	Answers
1. J	.---
2. 6	-....
3. F	..-.
4. I	..
5. /	-..-.
6. K	-.-
7. P	.--.
8. 2	..---
9. W	.--
10. N	-.
11. 9	----.
12. 7	--...
13. G	--.

To continue... Go to 122

CRITERION TEST #3; PART A - ANSWERS

Symbols		Answers
14.	C	-.-.
15.	H	....
16.	)	-.--.-
17.	Z	--..
18.	1	.----
19.	D	-..
20.	B	-...
21.	4	....-
22.	3	...--
23.	E	.
24.	.	.-.-.-
25.	M	--
26.	A	.-

To continue... Go to 123

CRITERION TEST #3: PART A - ANSWERS

Symbols	Answers
27. 5	.....
28. X	-..-
29. -	-....-
30. R	.-.
31. S	...
32. T	-
33. U	..-
34. V	...-
35. O	---
36. Q	--.-
37. Y	-.--
38. L	.-..
39. 8	---..

To continue... Go to 124

CRITERION TEST #3: PART A - ANSWERS

Symbols	Answers
40. 0	-----
41. ,	--..--
42. (	-.--.

Go to 125

CRITERION TEST #3: PART B - RECEIVING

1. .-..
2. ---
3. --
4. -.--.-
5. --.
6. ..---
7. .
8. ..
9. ....
10. -.-
11. ----.
12. -.
13. -...
14. --.-
15. -----
16. -.--
17. .--.
18. ..-
19. .....
20. .----
21. -..-.
22. ...
23. .-.
24. ...--
25. -.-.
26. -
27. -.--.
28. .-

To continue... Go to 126

CRITERION TEST #3: PART B - RECEIVING

29. -..

30. ..-.

31. ...-

32. .---

33. -..-

34. --..

35. .--

36. ....-

37. -....

38. --...

39. ---..

40. --..--

41. -....-

42. .-.-.-

Go to 127

CRITERION TEST #3: PART B - ANSWERS

Symbols	Answers
1. .-..	L
2. ---	O
3. --	M
4. -.--.-	)
5. --.	G
6. ..---	2
7. .	E
8. ..	I
9.	H
10. -.-	K
11. ----.	9
12. -.	N
13. -...	B

To continue... Go to 128

CRITERION TEST #3: PART B - ANSWERS

Symbols	Answers
14. --.-	Q
15. -----	0
16. -.--	Y
17. .--.	P
18. ..-	U
19.	5
20. .----	1
21. -..-.	/
22. ...	S
23. .-.	R
24. ...--	3
25. -.-.	C
26. -	T

To continue... Go to 129

CRITERION TEST #3: PART B - ANSWERS

Symbols	Answers
27. -.--.	(
28. .-	A
29. -..	D
30. ..-.	F
31. ...-	V
32. .---	J
33. -..-	X
34. --..	Z
35. .--	W
36. ....-	4
37. -....	6
38. --...	7
39. ---..	8

To continue... Go to 130

CRITERION TEST #3: PART B - ANSWERS

Symbols	Answers
40. --..--	,
41. -....-	-
42. .-.-.-	.

Go to 131

End of Test

1. If you correctly defined all symbols...

   Go to 132

2. If you missed any:
   - a. Make a list of the symbols you missed.
   - b. Practice defining these symbols.
   - c. Start with the symbols you find most difficult to remember.
   - d. Keep practicing until you can correctly define them.
   - e. Take the next criterion test...

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CONGRATULATIONS! 132

You have shown that you know all of the symbols in this program.

Knowing these symbols will make you a better Signalman.

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SUGGESTIONS FOR REFRESHER TRAINING 133

People Forget	You will need to refresh your memory once in a while if you are to recognize these symbols on-the-job.
Suggestions	1. Review the symbols before you go to bed TONIGHT. 2. Review them again each night for ONE WEEK. 3. If you seldom use these symbols on-the-job, review them EVERY MONTH.

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Suggestions	4. Refresh your memory while you still remember. Don't wait until you forget, because relearning requires more effort than periodic refresher training.
	5. Check your performance during refresher training by using the criterion tests provided.
	6. Good luck!

END OF PROGRAM

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